25 CENTS

POPULAR MECHANICS

MA

MORE POWER FOR AMERICA

Biggest "fuse" you ever saw helps make electricity today's greatest bargain

BIG CIRCUIT BREAKERS act something like the simple household fuse the electrician is showing to these boys. They help protect the power lines that supply whole cities. If short circuits occur, they can switch off an enormous amount of power, then switch it on again in a fraction of a second—so fast your lights hardly even blink.

GENERAL ELECTRIC

Huge General Electric circuit breakers help electric utilities to bring you more electric power for better living

The towering circuit breakers pictured at left will help to make possible new progress by far-sighted electric utilities in bringing you today's economical, dependable electric power.

Like giant fuses, they will protect new super-power 330,000-volt transmission lines for the American Gas and Electric Co. system. Operating at the highest voltage ever used in America, these lines will be able to carry more electric power than any others in existence and so help to keep down the cost of delivering electricity.

In a twentieth of a second, if overloading or short circuits occur, the circuit breakers will switch off enough electric energy to hurl a 100-ton locomotive 460 feet in the air. Then, just as quickly, they will switch the power on again when the danger has passed. Fast action like this not only safeguards expensive electric equipment, but also keeps electricity more dependable through the hazards of storm and accident.

Huge circuit breakers such as these are just one of the many kinds of "switchgear" made by General Electric to help protect and control the enormous amounts of electricity required today.

Engineering enterprise and the financial daring of electric utilities in undertaking a 20-billion-dollar program of expansion since the war, are outstanding reasons why the supply of electricity continually keeps ahead of our growing demands. And thanks to constant technical progress, electricity comes to you at prices that make it the greatest bargain your dollar can buy. General Electric Company, Schenectady 5, New York. 054-1

SHORT CIRCUIT TEST EXPLOSION at General Electric's multi-million-dollar Switchgear Development Laboratory at Philadelphia shows what can happen when tremendous amounts of electricity get out of control. High power tests at this laboratory assist G-E engineers in designing all sizes of circuit breakers and other switching equipment to help keep your electric supply dependable under all conditions.

Engineering enterprise and financial daring make America strong

OVER 60,000 MILES of transmission lines have been built by electric utilities since World War II as part of a 20-billion-dollar expansion program. Protecting these lines are G-E circuit breakers and other control equipment.

THREE REASONS why electric utilities must now supply more electricity are shown above. Operating at the same time, all the TV sets, automatic washers and dryers bought since 1946 would use electricity equivalent to 25 million horsepower.

HUGE STEEL SHELL, called a "Hortonsphere," will house the prototype of an atomic power plant for a U. S. submarine. The power plant is being built by General Electric. G-E research and engineering work constantly to keep America strong.

Progress is our most important product

GENERAL ELECTRIC

Collier's

MAY 28, 1954 • FIFTEEN CENTS

Anybody Can Make More Money If...

•

The Plight of the Honest Cop

VICE SQUAD

By ALBERT DEUTSCH

•

JOHN GUNTHER

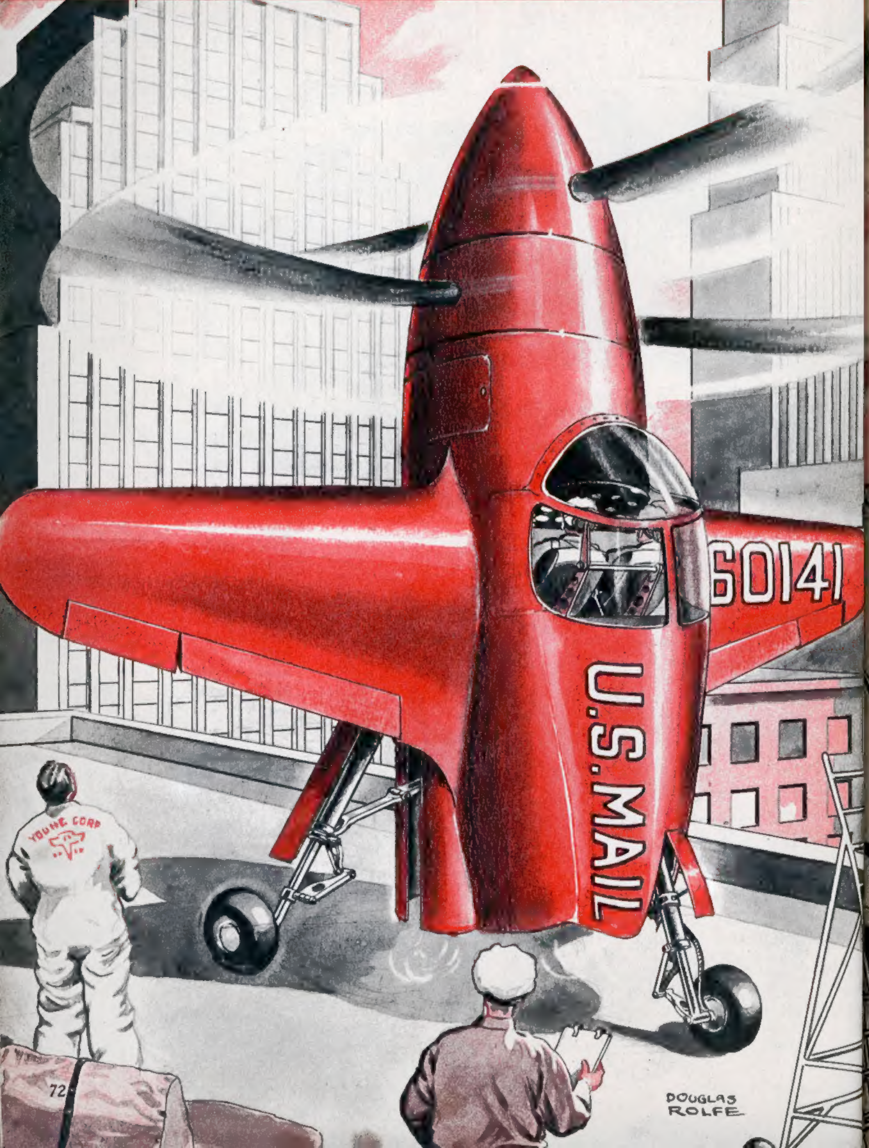
Inside Africa's GOLD COAST

WEATHER MADE TO ORDER?

By NAVY CAPT. H.T. ORVILLE

Ike's Adviser Reports Man's Progress in Weather Control

Convertible Jet Helicopter



BY GILBERT PAUST

WHEN you see a plane standing on its end in the sky—or on the ground—this will be the one!

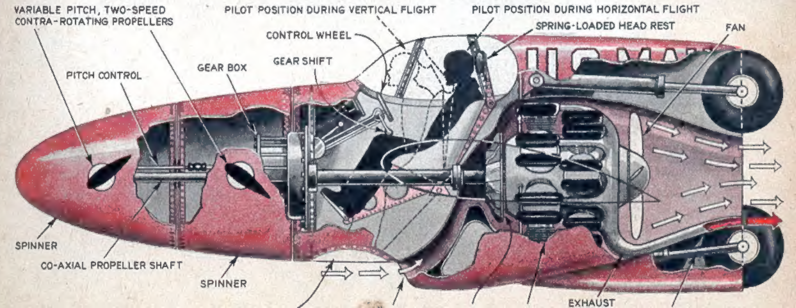
A radical new design, just granted a patent. is an airplane that can stick its nose up and act like a helicopter.

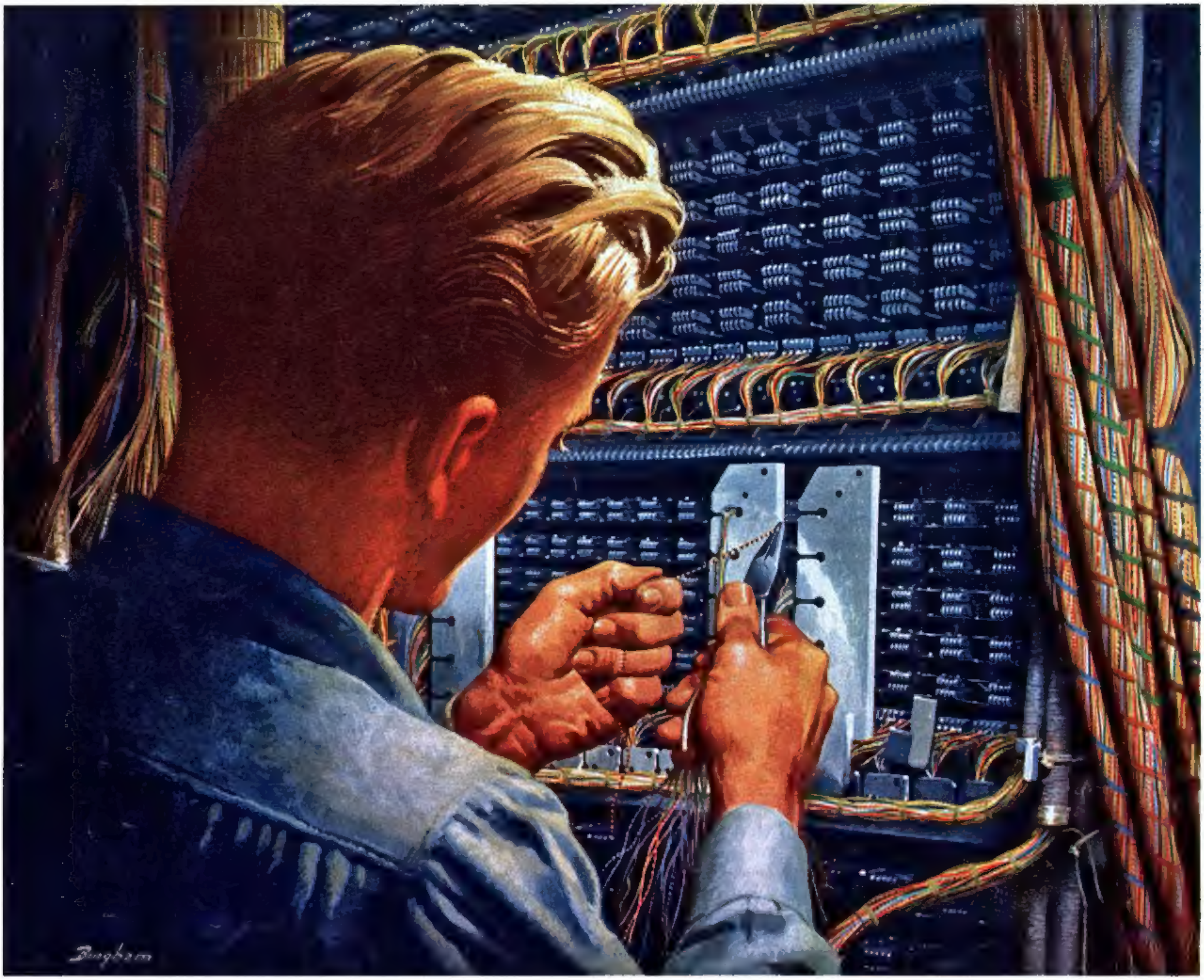
The craft has a plane's wings, ailerons and enclosed fuselage. Three wheels extending straight back to the rear allow vertical take-off and sit-down.

Contra-rotating co-axial props, larger than usual ones but smaller than rotors, lift it off the ground. Once in the air the pilot noses over and the same props pull it horizontally, like any ordinary plane. There's an extra window in the floor for the pilot to see through when flying vertically. Seats are adjustable according to the plane's position.

The new design allows use of small wings—which means increased efficiency at high speeds. A pitch-changing mechanism makes it unnecessary to shift gears and gives the props a big bite that increases speed.

The engine is located behind the pilot, and its jet provides useful thrust. •


VARIABLE PITCH, TWO-SPEED CONTRA-ROTATING PROPELLERS
PILOT POSITION DURING VERTICAL FLIGHT
PILOT POSITION DURING HORIZONTAL FLIGHT
SPRING-LOADED HEAD REST
FAN
CONTROL WHEEL
GEAR SHIFT
GEAR BOX
PITCH CONTROL
SPINNER
CO-AXIAL PROPELLER SHAFT
SPINNER
EXHAUST



Young man with good connections

In a Bell telephone central office, this Western Electric installer is connecting thousands of wires to new equipment to provide more and better service.

He's one of 18,000 trained Western Electric installers who do this job for Bell Telephone companies. Crews are working in some 1,600 central offices to connect new equipment which, like your telephone, is made by Western Electric.

● Western Electric is part of the Bell System—has been since 1882. This assures closest cooperation between people who *design* telephone equipment, people who *make* it and people who *operate* it. Their teamwork has given this country the best telephone service on earth.

MANUFACTURER
of telephone apparatus for the Bell System.

PURCHASER
of supplies for Bell Telephone companies.

DISTRIBUTOR
of Bell telephone apparatus and supplies.

INSTALLER
of Bell System central office equipment.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

5,000 B. C. the weather had become much milder. Green forests spread into the northlands where they exist today. After the twelfth century however, the weather cycle swung low and the climate became more severe. Winters became longer and the glaciers reached their maximum during this "Little Ice Age" from 1650 to 1850.

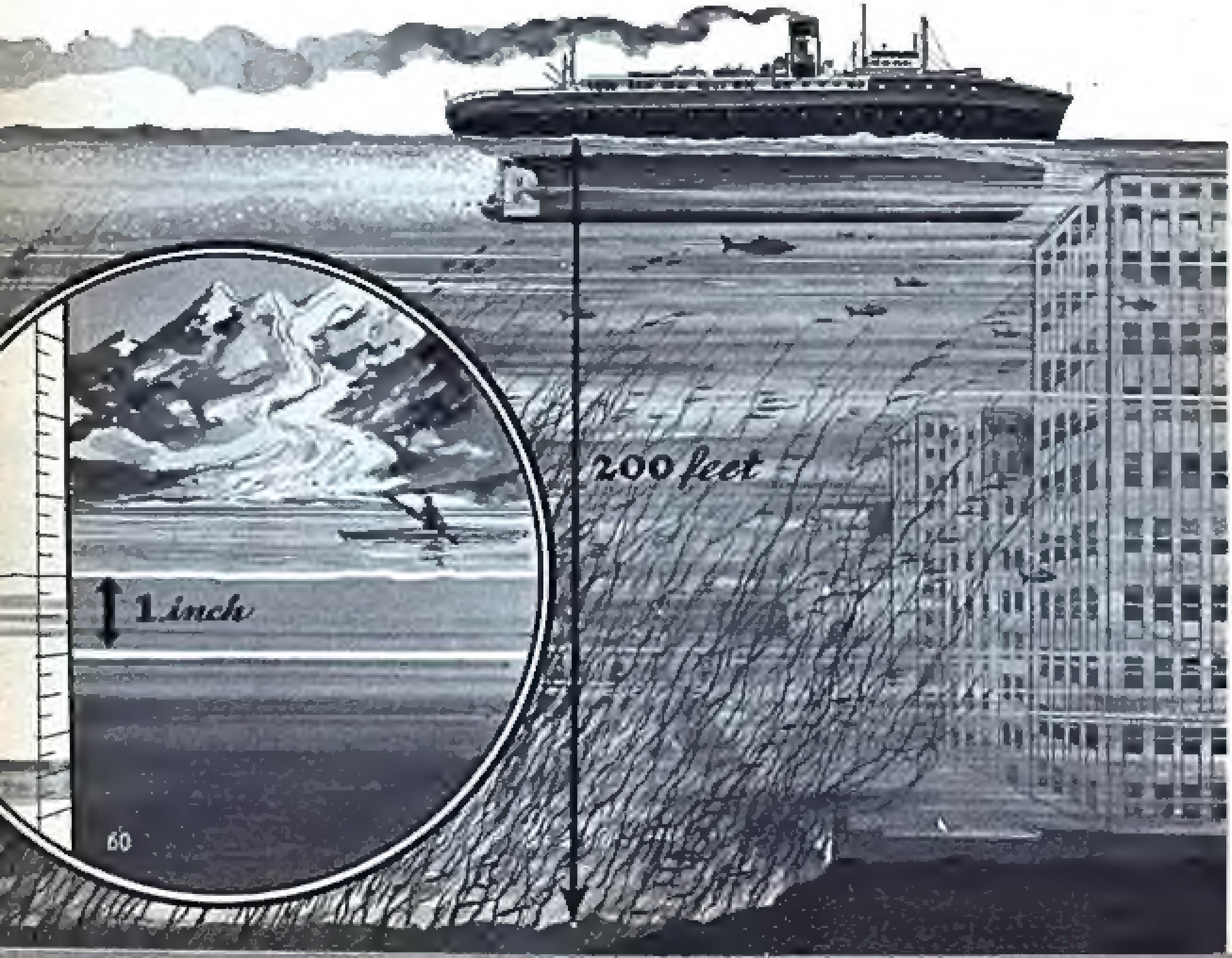
Since 1850 the glaciers have been retreating under a climate of shorter winters and warmer summers. Despite the fact that our snowiest winter was but five years ago, you may discount that as being no more than a break in the cycle; the trend toward warmer climate persists. Whether it will fluctuate, become stronger or weaker, is all within the fancy of time. Certainly none of us will live to see such drastic changes as the melting of the icecaps.

A tornado has no part in the machinery of climate. Rather it is the accidental loose nut that flies off the machine or the backfire of an otherwise normal storm cycle. A tornado is like a whirlpool where two tides meet. You can get the effect of one by rolling a pencil between your two palms. Each hand represents a different air mass; the pencil which turns rapidly but moves slowly up or down each hand acts just like the long funnel of a twisting tornado. Try it and see.

When a warm moist air mass meets a cold front head-on, the motion of the two different kinds of air (like the two hands), causes friction and extreme low pressures. Once a low pressure area funnels into a definite pattern, it will spiral earthward as a tornado "cloud" or funnel. The waterspout is just a tornado over the water and although most people think the waterspout contains water being sucked up from the sea, it is merely a cloud being formed by condensation within whirling air. The sea water sucked upward in a waterspout seldom rises more than two or three feet and when the spout disappears, tons of sea water do not fall back into the sea, but the fresh water forming the cloud just disappears back into the atmosphere again.

Whereas a 500-mile whirlpool (hurricane) will blow down a house, a 1,000-foot whirlpool (tornado) will suck down a house. Such concentrated low air pressure outside the house will make it explode outward, blown apart by high air pressure within the house just as an automobile tire

During the present century, melting of mountain glaciers has raised the levels of our oceans one inch, Insert. But if the polar icecaps should melt completely, levels would be raised 200 feet or more.



a chemical is a chemical is a chemical . . .

SCIENCE and MECHANICS

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What to Do When Your Furnace Quits

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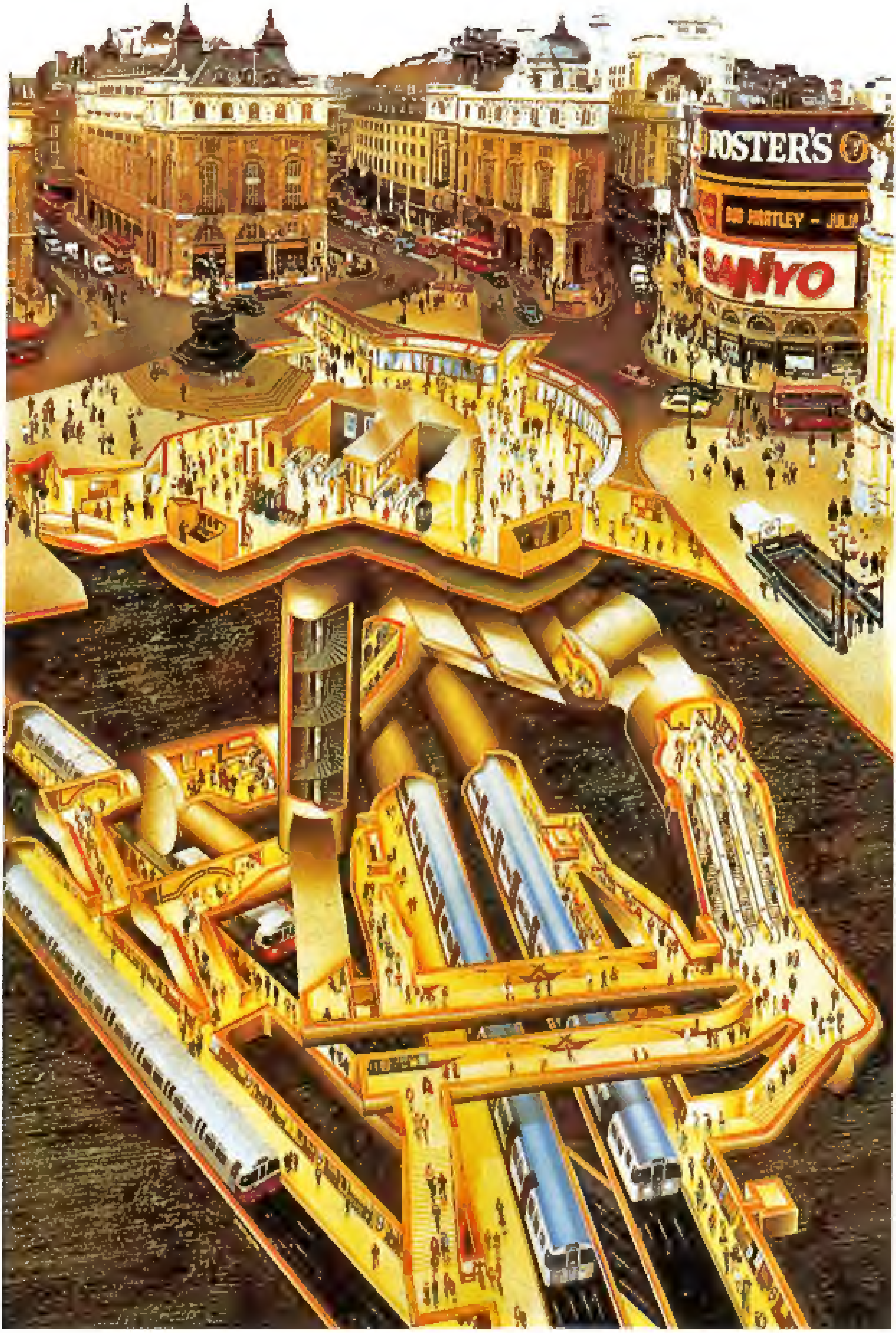

FOSTER'S
SANYO

new wonders on the way

The telephone that made America only a minute wide is still in its infancy.

Even now the telephone of tomorrow is taking shape! In General Telephone Laboratories, men of imagination are translating scientific dreams into realities that will open an exciting new world of communications.

Their goal: to anticipate your future telephone needs and discover new ways of making your telephone more useful.

Past contributions of General Telephone include: the dial system; operator toll dialing; automatic toll ticketing; unattended dial exchanges.

GENERAL SYSTEM

GENERAL TELEPHONE SYSTEM

ONE OF AMERICA'S GREAT COMMUNICATIONS SYSTEMS · 260 MADISON AVENUE, NEW YORK, N.Y.

YOU CAN BE SURE..IF IT'S Westinghouse

DEC 1949

BEGINNING OF A STATE OF ABUNDANCE

Spoken words by wire! Amazing. That's how people felt when the telephone was young.

This strange invention grew and grew ...but never so fast as now!

In 1882, when Western Electric joined the Bell System, there were less than one hundred thousand Bell telephones and few cities were interconnected. Today there are 29 million interconnecting Bell telephones—carrying more than 166 million calls a day.

Western Electric has supplied most of the equipment for this tremendous growth. In all, Western Electric has made 50 million Bell telephones—over 10 million since the war.

Think, too, of all the complex equipment in more than 7,700 central offices—the more than 112 million miles of wire in Bell System circuits—the endless quantities and varieties of other equipment and supplies needed for your service—nearly all manufactured or purchased by Western Electric.

Schedules for production of telephone apparatus and installation of central office equipment in 1948 call for continuing record-breaking performance to help meet unprecedented demands for service. By doing this huge job efficiently and economically, Western Electric helps to make your Bell telephone service the world's best at the lowest possible cost.

MANUFACTURER... of 43,000 varieties of telephone apparatus.

PURCHASER... of supplies of all kinds for telephone companies.

DISTRIBUTOR... of telephone apparatus and supplies.

INSTALLER... of telephone central office equipment.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

Banquet for Bacteria?

Milk is nature's most perfect food [illegible] subject to bacterial [illegible]. Therefore one of the dairy industry's biggest [illegible] keep this perishable liquid pure and sweet after it leaves the cow [illegible] see that it doesn't become a "banquet for bacteria."

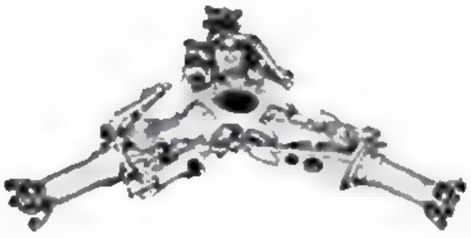
That's where Mathieson chemical research came into the picture. Our laboratories developed Ho-Bax, a powder that makes bacteria fight for existence. The dairyman simply adds Ho-Bax to water and presto [illegible] he has a quantity of [illegible] rinse that will quickly sanitize every surface with which milk comes in contact.

Ho-Bax effectiveness [illegible] a must [illegible] for maintaining the highest standard [illegible] milk and milk products [illegible] is another example of the product excellence which makes the name MATHIESON a symbol of quality in American Industry. The Mathieson Alkali Works (Inc.), 60 East 42nd Street, New York 17, N. Y.

Mathieson
CHEMICALS

How a helicopter hangs by its "elbows"

For flexible "elbows" —rotor assemblies that control the maneuvers of its H-21 Helicopter—Piasecki looks to Lycoming's precision production



Straight up, straight down, forwards, backwards, or just hovering—the Piasecki "Work Horse" Helicopter's peculiar flying maneuverability rests in its rotor assemblies. It is these flexible "elbows" that adjust the pitch of the 'copter's great blades. Each unit involves more than 625 separate parts. To machine and assemble them, Piasecki depends on Lycoming for precision production.

Lycoming stands ready to assist you whether you have a metal product that needs speedy precision or volume fabrication—or "just an idea" in the rough or blueprint stage. Long famous for its metal-working skill, Lycoming continues to meet the most exacting requirements in a wide diversity of fields, both industrial and military. *Whatever* your problem—look to Lycoming!

More than 6,000 machine tools, a wealth of creative engineering ability and 2½ million feet of floor space stand ready to serve your needs.

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION

LOOK TO LYCOMING FOR RESEARCH FOR PRECISION PRODUCTION

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Lycoming-Spencer Division
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652 Oliver Street
Williamsport, Pa.

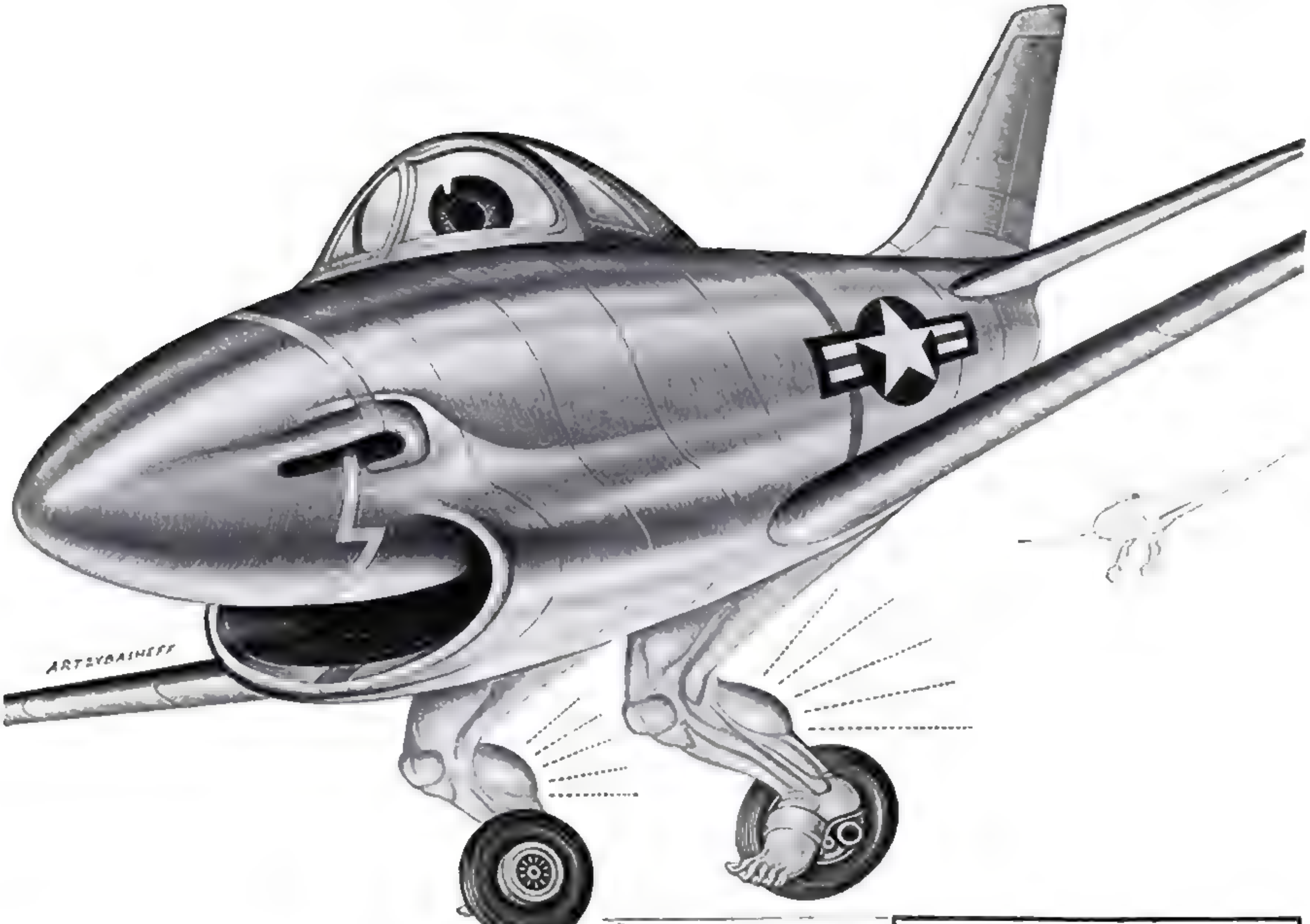
Please send me further information on Lycoming's varied abilities and facilities.

Name________________________

Firm____________Title____________

Address________________________

City__________Zone____State______



"Leg muscles" that cushion a jet's landing

For main leg cylinders that enable a Sabrejet to absorb the jolt of high-speed landings—Cleveland Pneumatic looks to Lycoming's precision production

When the landing gear of an F-86 Sabrejet hits the runway at lightning speed, the shock is absorbed by hydraulic action within the tough, precision-made cylinder on each "leg." To machine these 37-lb. cylinders to exact tolerances from solid 158-lb. steel forgings . . . to give them mirror-smooth inside finishes . . . Cleveland Pneumatic depends on Lycoming.

If *your* metal-working needs—like Cleveland Pneumatic's—can be solved by precision production, or if your problem is volume fabrication, or "just an idea" in the rough or blueprint stage—*look to Lycoming.* Long famous for metal-working skills, Lycoming meets the toughest specifications of exacting customers, both industrial and military.

Lycoming's 2½ million square feet of floor space, its more than 6,000 machine tools, and its wealth of creative engineering talent all stand ready to serve your needs.

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME MACHINE PARTS • STEEL-PLATE FABRICATION

FOR RESEARCH · FOR PRECISION PRODUCTION

LOOK TO LYCOMING

LYCOMING-SPENCER DIVISION — WILLIAMSPORT, PA.
BRIDGEPORT-LYCOMING DIVISION — STRATFORD, CONN.
AVCO

Lycoming-Spencer Division
AVCO Manufacturing Corp.
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Please send me further information on Lycoming's varied abilities and facilities.

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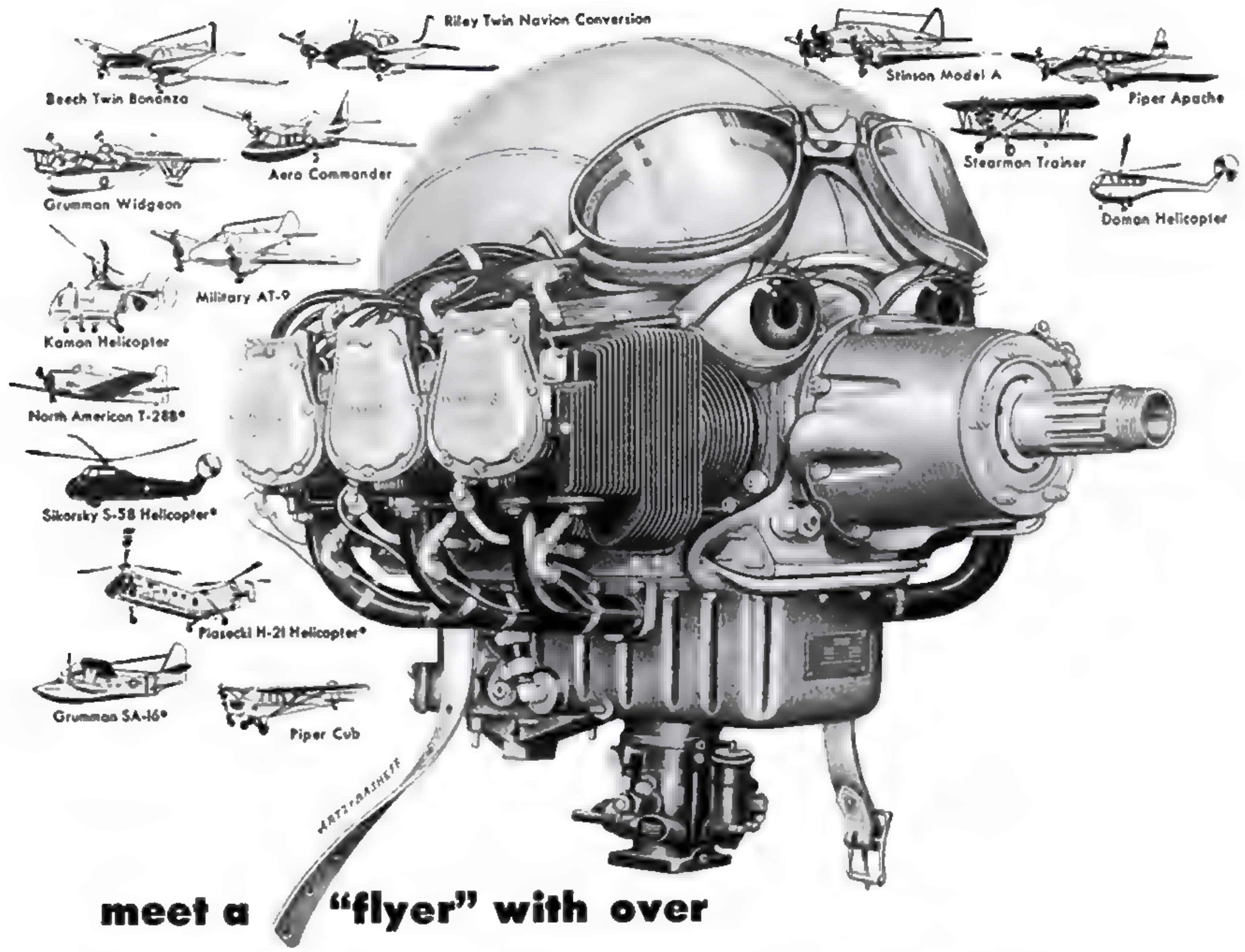
Firm__________ Title__________

Address____________________

City__________ Zone____ State____



meet a "flyer" with over 250,000,000 hours behind him!

"He's" a new Lycoming air-cooled engine. He's backed by Lycoming's experience in creating and producing 50,000 aircraft power plants . . . each with a flight-proved life expectancy of at least 5,000 hours.

You learn a lot about flying in 25 years . . . and 50,000 engines!

Our first Lycoming aircraft engines gained us invaluable experience flying for one of America's first scheduled air lines. Their successors have flown military missions in aircraft from liaison planes, to trainers, to helicopters. As "civilians," they now fly small single-engine utility planes, and leading twin-engine "flying offices" for businessmen.

Do *you* need this kind of dependable air-cooled power . . . or any of the diversified services listed above our signature? Lycoming's wealth of creative engineering ability . . . its 2½ million square feet of floor space . . . and 6,000-plus machine tools stand ready to serve you. *Whatever* your problem . . . *look to Lycoming!*

Aircraft Engines
Industrial and Tank Engines
Engine Overhaul
Generating Units

Turbine Engineering and Research
Engineering Design and Development
Hardened and Ground Precision Parts
Gears and Machine Parts

Complete Assemblies
Heat-Treating and Plating
Steel Fabrication
Castings
Boilers

FOR RESEARCH · FOR PRECISION PRODUCTION

LOOK TO **Lycoming**

DIVISION OF AVCO STRATFORD, CONN.
Manufacturing plants in Stratford, Conn., and Williamsport, Pa.

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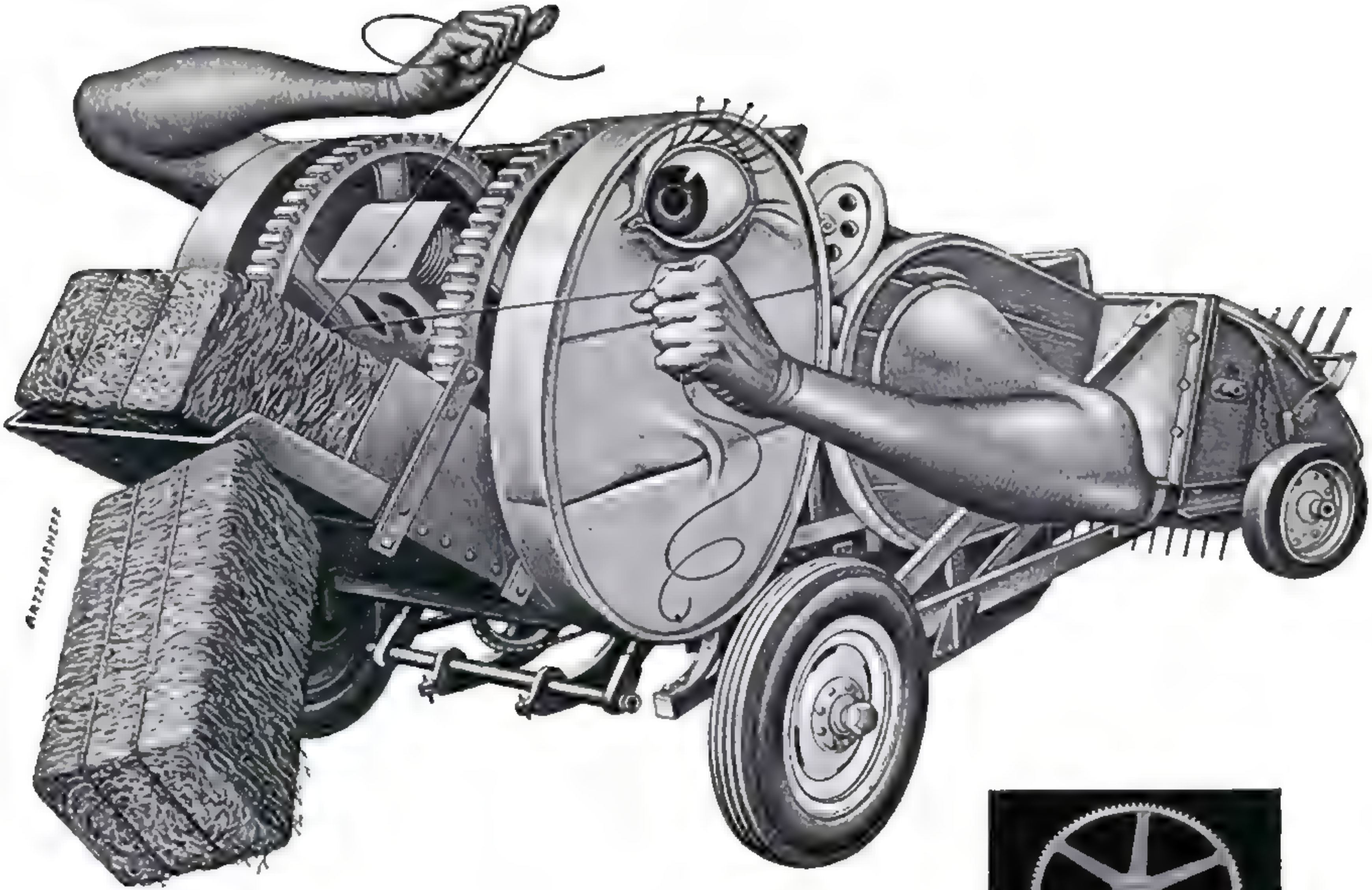
*Wright Cyclone engine, built by Lycoming under license from Curtiss-Wright Corporation, Wright Aeronautical Division.



Strong "wrists" for America's new hay balers

Whisking through fields of hay . . . picking up and handling an almost incredible 2,500 bales per day . . . this man-saving, time-saving, money-saving NEW IDEA hay baler needs mighty tough gears to keep its tying mechanism on the job. To be certain these steel "wrists" have maximum strength and durability . . . NEW IDEA looks to Lycoming.

Do *you* need a precision part . . . volume production of a metal product . . . a dependable air-cooled engine . . . or development of "just an idea" in the rough or blueprint stage? Then remember—many of America's industrial and military leaders credit Lycoming with solving their most complex metal-working problems. Whatever your problem . . . *look to Lycoming!*

More than 6,000 machine tools, a wealth of creative engineering ability, and 2½ million square feet of floor space stand ready to serve your needs when you look to Lycoming.

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION

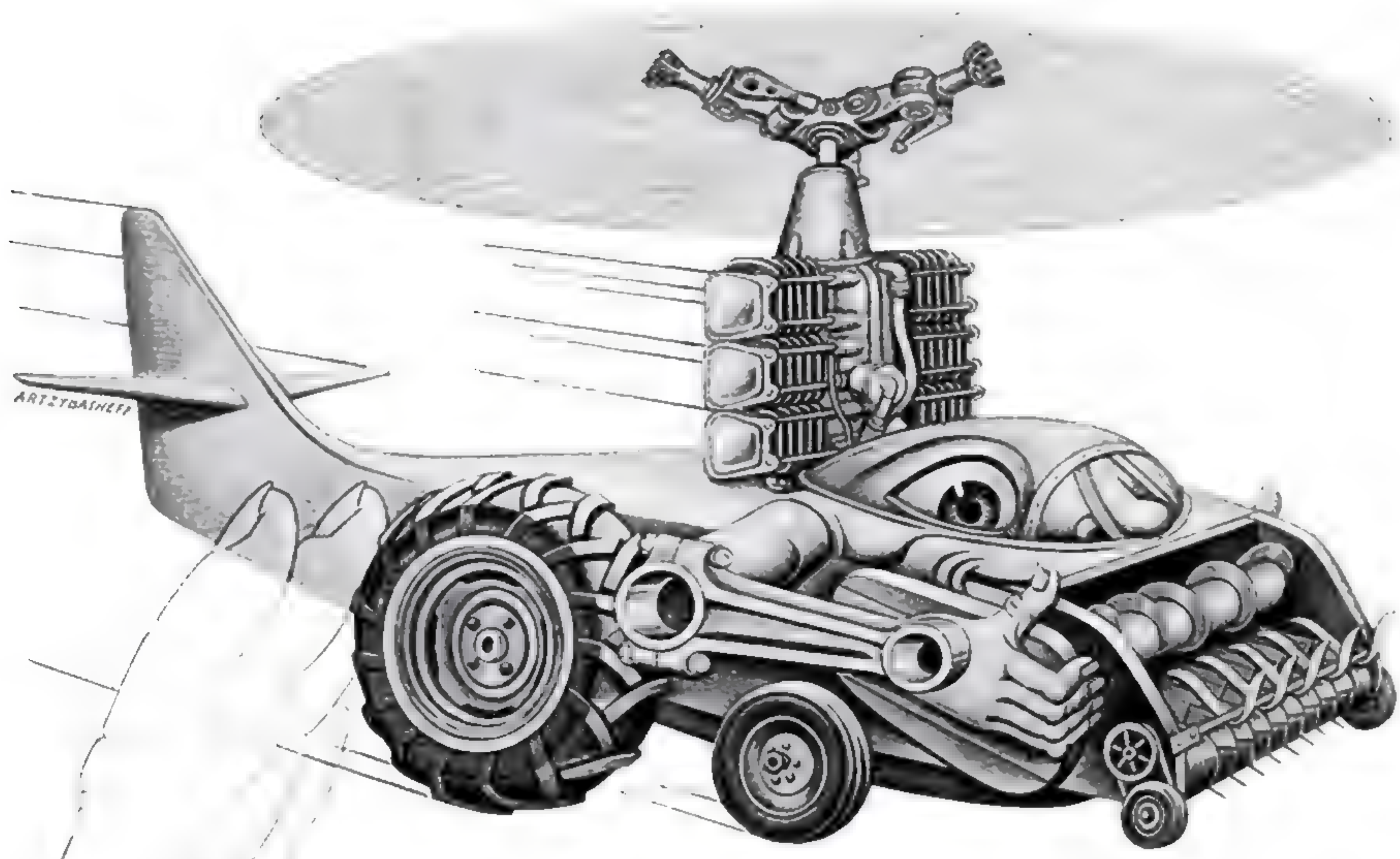
For sturdy, unfailing spur and bevel gears—"wrists" that drive the tying mechanism of its "one-man" hay baler—NEW IDEA looks to Lycoming for precision production.

FOR RESEARCH • FOR PRECISION PRODUCTION

LOOK TO LYCOMING

Lycoming-Spencer Division, Williamsport, Pa. AVCO Bridgeport-Lycoming Division, Stratford, Conn.

For a more complete story on Lycoming's varied abilities and facilities, write—on your company letterhead—for the illustrated booklet, "Let's Look at Lycoming."



The hand that helps keep America "running"

For precision production so vital to products that contribute to America's progress . . . leaders in industry look to the skilled hand of Lycoming.

This is the hand that machines vital components for GENERAL ELECTRIC J-47 jet engines . . . that turns out sturdy connecting rods for FORD trucks . . . that produces durable gears for NEW IDEA farm machinery . . . that makes rotor assemblies for PIASECKI helicopters . . . that creates air-cooled engines for executive aircraft such as AERO COMMANDER, BEECH, GRUMMAN, RYAN and PIPER

. . . this is the skilled hand of Lycoming precision production.

Long on experience, varied in skills, huge in production—Lycoming always meets the most exacting metal-working requirements of leaders in American industry. So whatever your problem . . . *look to Lycoming!*

For a more complete story on Lycoming's varied abilities and facilities, write on your company letterhead for the illustrated booklet "Let's Look at Lycoming."

SOME OF THE LEADERS WHO LOOK TO LYCOMING

American Car and Foundry Company • Air Materiel Command • Bendix Aviation Corp. • The Cleveland Pneumatic Tool Company • Doman Helicopters, Inc. • Food Machinery & Chemical Corporation Ford Motor Company • General Motors Corporation *Chevrolet-Aviation Engine Division* • Kaman Helicopter Corp. • Navy Bureau of Aeronautics • Piasecki Helicopter Corp. • Pratt & Whitney Aircraft Sylvania Electric Products, Inc. • Thompson Products, Incorporated • Westinghouse Electric Corporation • Wright Aeronautical.

FOR RESEARCH · FOR PRECISION PRODUCTION

LOOK TO LYCOMING

Lycoming Spencer Division, Williamsport, Pa. AVCO Bridgeport Lycoming Division, Stratford, Conn.

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION

What a beaut

and worth every buck it cost

Now's the season for did-it-myself farmers. They're starting to show off soul-stirring backyard crops.

Occasionally, a spouse may drop some cruel remark about buying it cheaper at the grocery store, but that completely overlooks the point. *Power*-gardening is fun! What city soul is so dead he doesn't feel the age-old urge to scratch the earth and come up with food? True—every year that urge seems to go for less scratching. Because do-it-yourself backyard farmers have certainly decided in a big way to let engines do it for them.

Garden tractor sales jumped 800% in eight years and lawn mowers have been motorized till there's scarcely an aching muscle left in suburbia. Steel has taken out the pain and left just the fun for modern gardeners.

Taken all together, these power garden tools require as many types of steel as an automobile. Tubular steel for the handles; pressed steel for the housings, alloy steels for the engines. And Republic makes all these kinds of steel. Republic also fabricates a great many parts for garden equipment manufacturers.

But all the steel going into backyard farming is still small potatoes to what the professional farm equipment manufacturers use—2,760,000 tons yearly. Steel is today's best hired hand.

A few highlights from Republic's continuous farm research program are pictured below.

REPUBLIC STEEL

General Offices • Cleveland 1, Ohio

World's Widest Range of Standard Steels and Steel Products

HOW TO SAVE THE RUINED EARTH Soil has been ruined, farmed out, in large areas of our country. On Republic's research and development farm a method has been worked out for restoring these acres to high-profit meat production. Worn-out land has been seeded with grass, some acres fertilized with ammonium sulphate which Republic makes, and others irrigated through steel pipe, also Republic's. Weighing the cattle every week shows how much extra grass and therefore meat comes from fertilizing and irrigating. They both pay off.

EVER WONDER WHY FARM FENCES ARE CRIMPED? The crimps, or tension curves, are important to good fence construction. Due to their springiness they absorb expansion and contraction caused by summer and winter weather, keeping the fence taut. Republic Fence has deep tension curves to insure good performance.

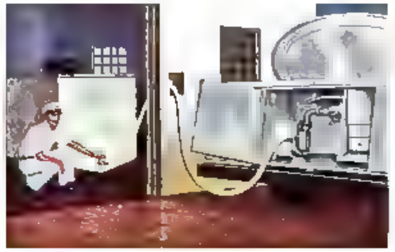
Republic makes steel posts with springiness, too. Cows like to scratch themselves on fence posts and if the post has no "give," it may snap off. Republic rolls its posts from high-quality steel with lots of spring in it. They're actually re-rolled railroad rails.

BUT NOT ALL IS STEEL FROM REPUBLIC STEEL Republic Plastic Pipe is gaining wide use as water lines from pump to stock trough, or chicken house or wherever. It's tough and doesn't burst even during freezing weather. It's so light and easy to handle, a 400-foot roll of ¾" weighs barely over 50 pounds.

City folk are going strong for lawn sprinkling systems made from Republic Plastic Pipe. They're using it for piping water to backyard gardens. Ideal for summer cottage water systems, too! Put them in yourself. Buried only a few inches is enough.

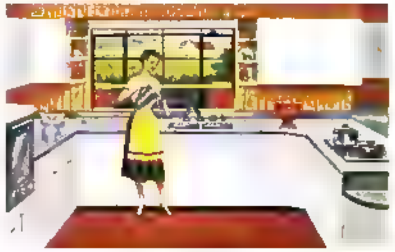
CORRUGATED SHEET METAL HAS TO WITHSTAND WIND. You read a lot about metal roofing for barns and farm houses. There's one fact that should precede all others: it's no good if it blows off. Since Republic's Galvanized Steel Sheets are strong, they can resist a wind which could rip nail heads through softer metal. Steel roofing is easy to apply, vermin proof and fire resistant.

Republic's galvanizing process is exceptionally good. Republic developed some new methods that make a superior coating. Get your steel sheets from a Republic Dealer and you'll be satisfied.



REMEMBER THE FARMER'S MILK CANS? They used to stand along the road in the dust. Now, the newest and cleanest method for bringing milk to town is in a stainless steel tank truck. The milk is pumped from the farmer's stainless steel bulk cooler directly into the dairy's stainless delivery truck.

Stainless steel is used because it is so easy to clean. A leading university, using radioactive bacteria, showed that stainless was the most cleanable, non-breakable material for eating surfaces. U. S. Health Standards specify only stainless or glass for milk handling.



A HEAP O' LIVING HAPPENS IN RURAL KITCHENS! Warm overtones of country living always have begun in the big, friendly farm kitchen. Today the farmer's wife unties her apron strings hours earlier, thanks to electricity and the wonderful time- and work-saving kitchen helpers made of Republic Steel. Sturdy cabinets of Republic Steel won't shrink, swell, warp or sag. And many a country housewife, familiar with the performance of Enduro Stainless Steel in the dairy, insists that her sink and counter tops be made of this same satin-smooth, carefree material.

Republic designers have adapted steel construction in fascinating ways. Walls of this modern school building are Vision-Vent Panels produced by Republic's Truscon Steel Division. Vision-Vent is a complete prefabricated wall panel with window. You get the mass-production and installation economies of standard steel windows.

Boys haven't changed
but schools have, that's why . . .

Willie seldom plays hooky these days!

YOU PARENTS KNOW that the younger generation is just as adventurous as boys and girls always have been. The spring sun shines as brightly . . . the games are as exciting . . . and the places down the road are as inviting as ever.

WHAT'S CHANGED? It's just plain *more fun* to go to school today. New teaching techniques make instruction more interesting, learning less painful. Newer schools are more attractive physically. Lighter, brighter, more inviting. Republic steels and steel products, plus the genius of contemporary architects, engineers and builders, have helped make school for all ages a more healthful, pleasant and stimulating place to spend the day.

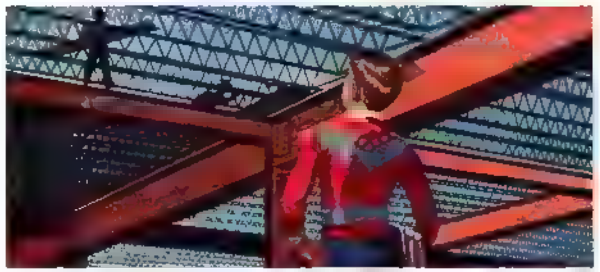
YOU TAXPAYERS BENEFIT, TOO. Steel school construction is economical. Steel stands up to youthful exuberance. Steel is strong, long-lasting, fire-resistant. Steel construction materials will serve your community well for generations.

IF YOU'VE A SCHOOL SHORTAGE PROBLEM (And what community hasn't?), remember that your hard-earned tax dollars buy more real value when your planning board and architects recommend and use steel construction and Republic Steel building products. Better schools build better communities and a stronger America.

REPUBLIC STEEL
CLEVELAND 1, OHIO
World's Widest Range of Standard Steels and Steel Products

HIS STEEL LOCKER IS HANDLE-FREE. It's a Key Control locker. The key serves as door handle [illegible] left unlocked. Corridors are free from projecting handles; school budgets save the costs of handle maintenance. Key Control lockers are an exclusive product of Republic's Berger Division.

LIGHT BRIGHT WEATHERTIGHT STEEL WINDOWS BY TRUSCON. Capture sun and sky through versatile steel windows made by Republic's Truscon Steel Division. Strong steel sash sections can be slim and light-looking. Your architect knows the wide range of Truscon metal windows for schools, offices, factories, homes.



FIRE-RESISTANT CONSTRUCTION WITH STEEL. Truscon steel joists make school floors and roofs strong, safe and fire resistant. They save weight and allow passage for pipes and conduit. They can be important factors in designing for expansion upwards. Truscon metal lath and plaster construction give ceilings and walls high fire-resistance ratings. Republic ELECTRUNITE® E.M.T.—electrical metallic tubing—protects school wiring. Republic's E.M.T. is inch-marked to facilitate installation and help make the job more accurate. Inch-marking is an exclusive Republic advantage. Insist upon steel's fire resistance for ceiling, walls and floor in your schools.

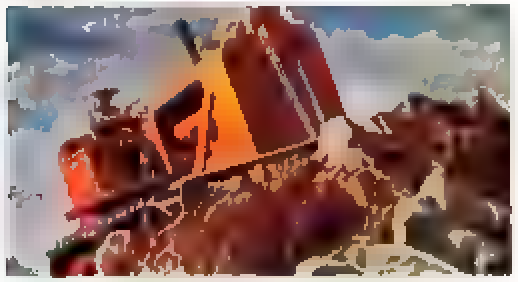
GREATER SAFETY WITH ALLOY STEELS. School buses get highway privileges. That's for safety. Many working parts are made from Republic alloy steels for greater safety too. Alloy steel parts are strong, tough, wear resistant to help keep school buses on schedule. Safe bus bodies, too, start as wide Republic steel sheets. Republic, world's largest producer of alloy and stainless steels, makes the steel only, serving most automotive parts makers.

HIGH STYLE FOR SCHOOL OFFICES. Republic Berger file cabinets do double duty by providing efficient storage and serving as counters to divide departments. Matching desks, tables, storage cabinets and bookshelf units all are available through Republic's Berger Division. Republic-Berger desks and tables feature brilliant new colors and lighter, brighter "eye-comfort" tops. At leading office furniture dealers throughout the nation.

APPETIZING APPEALING ATTRACTIVE FOR KEEPS. Republic ENDURO® Stainless Steel is the ideal metal for school cafeterias. ENDURO is remarkably easy to clean and to keep clean. ENDURO equipment is completely sanitary with no applied surface to chip, peel or wear away. It looks spotless, is spotless, stays spotless. Leading manufacturers make all types of ENDURO Stainless Steel cooking and serving equipment. Republic will help you locate them.

NO THUMP AS YOU ROLL [illegible]

MORE THAN 40 TONS OF STEEL A MILE [illegible]



TODAY'S EARTHMOVERS AND BULLDOZERS [illegible] push hills into their own valleys [illegible] Thanks to the super strength, toughness and [illegible] of the alloy steels which make today's [illegible] Republic is the world's largest producer of alloy and stainless steels and maintains field service men to help with your design problems.

Do you ever dream of an open road?

To whirl along with all the joy your car can offer—that's something to want. Yet it's but a small part of what uncluttered, safe highways can provide you. You've a right to drive from town to town without entering a deathtrap. And to benefit from the national growth which always follows broad new arteries of commerce.

The roads America can build today—right now, as soon as everyone demands them—are not merely longer roads and broader. They're better and *safer*.

You can have ribbons of seamless concrete, unbroken by expansion cracks. These continuous surface highways are safer and smoother to drive on and they resist longer the destructive power of ice.

Ready for the new highways are the sinews of steel built by Republic—over 40 tons for each mile of average road, tremendously more for each mile of super turnpike.

Road building is an investment in and for the future. Roads benefit every one. They stimulate commerce and create employment. The construction of the highway is only the beginning. The buildings which will follow the highways call for millions of man hours and millions of tons of materials. Republic is ready with the steel.

REPUBLIC STEEL

CLEVELAND 1, OHIO

World's Widest Range of Standard Steels and Steel Products

WHAT HAPPENS TO STREAMS [illegible]

EVERY NEW ROAD OPENS PIONEER COUNTRY [illegible]

MANY OF TODAY'S SAFE, ROOMY AUTO BODIES [illegible] Stainless Steel [illegible]

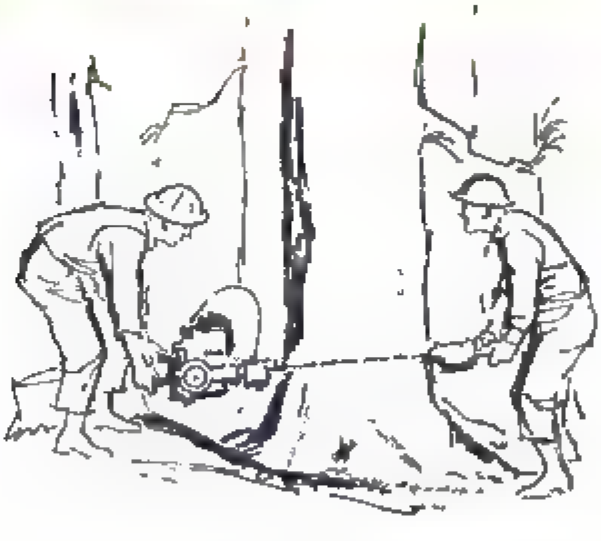
NEW DEPARTURES OF TOMORROW

Even Paul Bunyan couldn't match the pace of this "automatic lumberjack" of the future. It fells, sections and loads trees—all at the push of a button!

The company that launches this wonder will probably look to New Departure for ball bearings. For New Departures have proved their ability to hold moving parts in perfect alignment, cut wear and friction, and work long hours without letup—or upkeep. Above all, New Departure has lived up to its name—being *first* with ball bearing advancements.

So, when improving or designing a product, count on New Departure for the finest ball bearings.

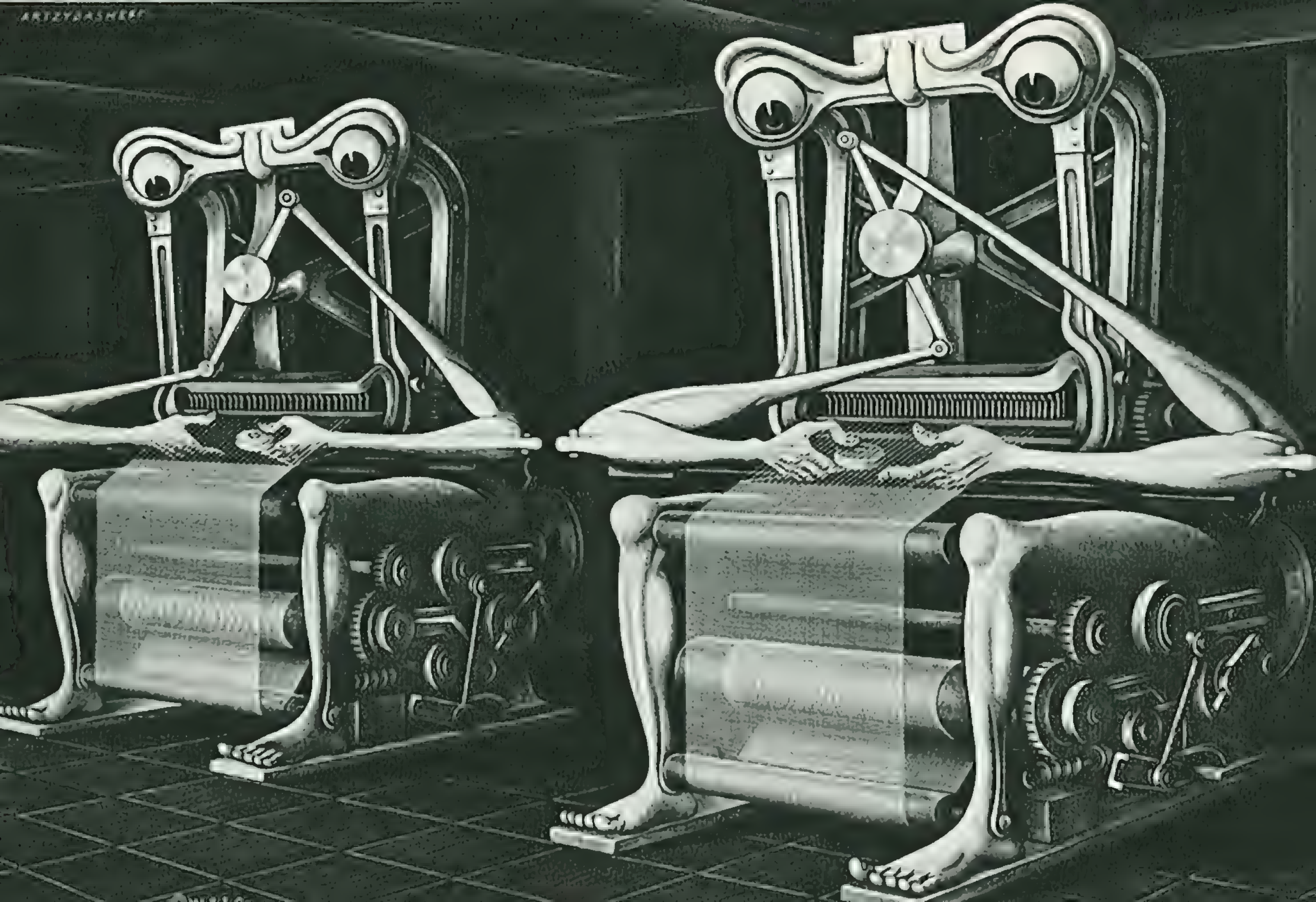
NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT



Cool-running chain saw, like every type of power saw in use today, uses New Departure ball bearings for longer life at peak efficiency.

NEW DEPARTURE
BALL BEARINGS

NOTHING ROLLS LIKE A BALL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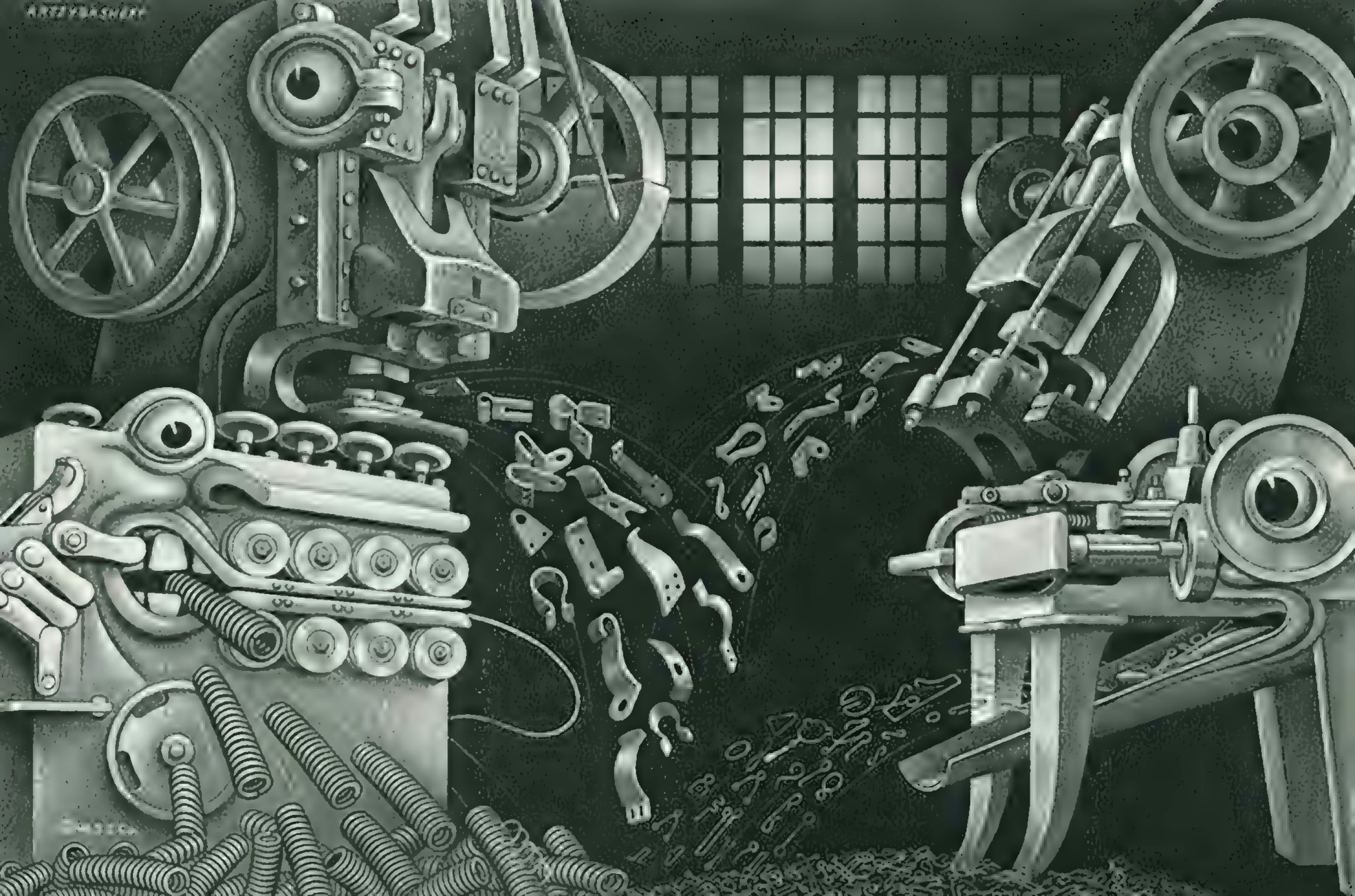
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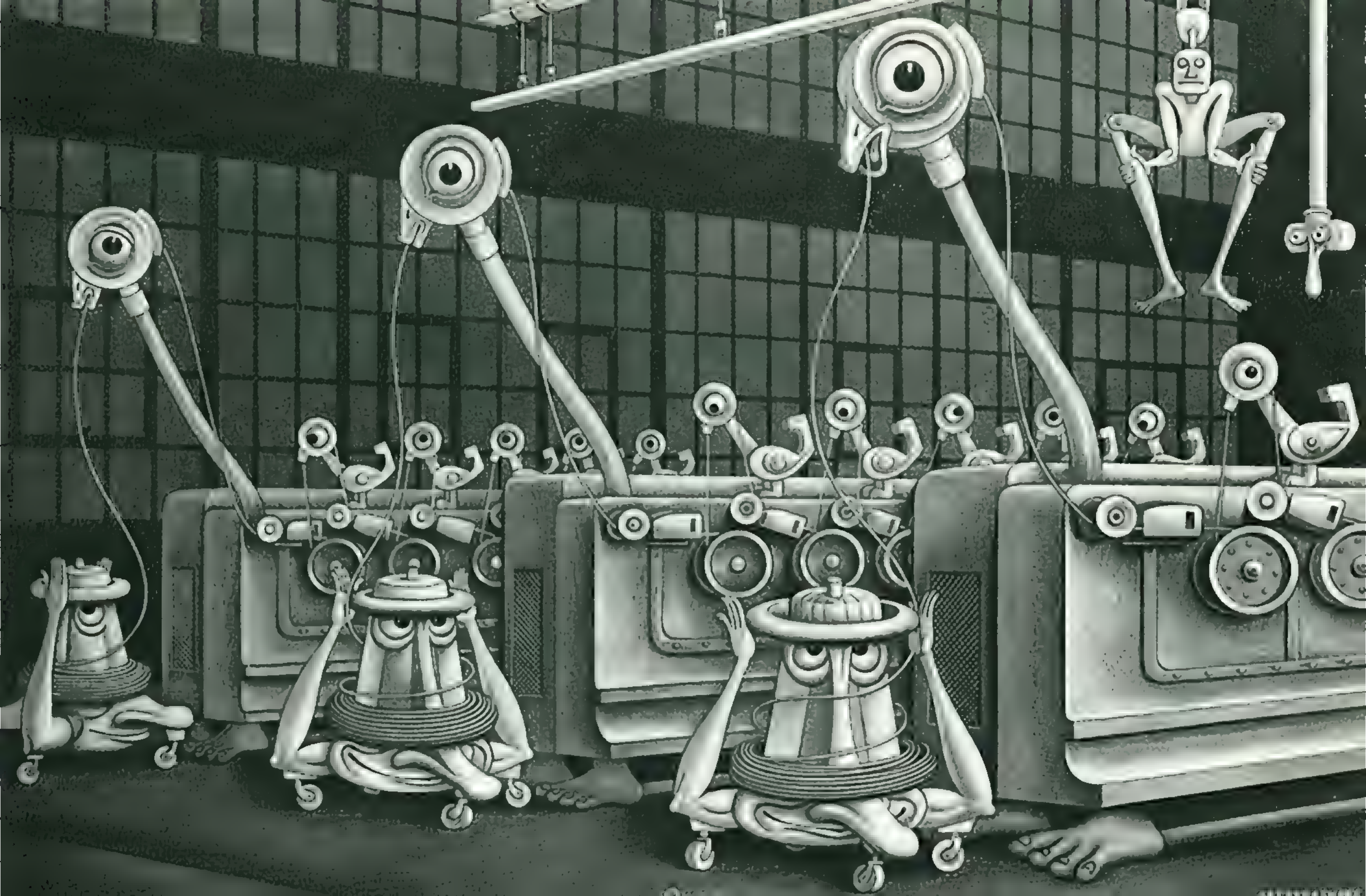

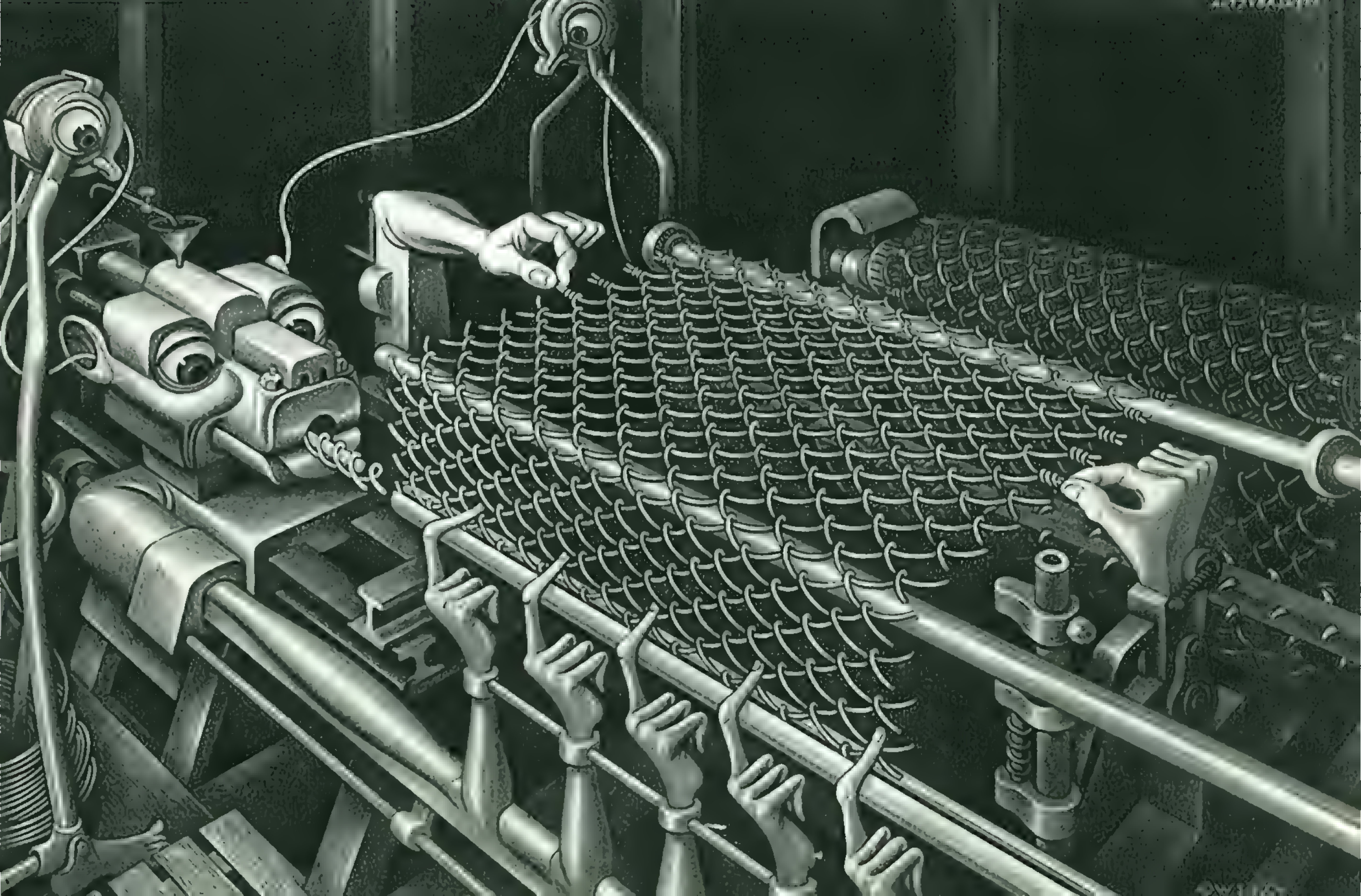

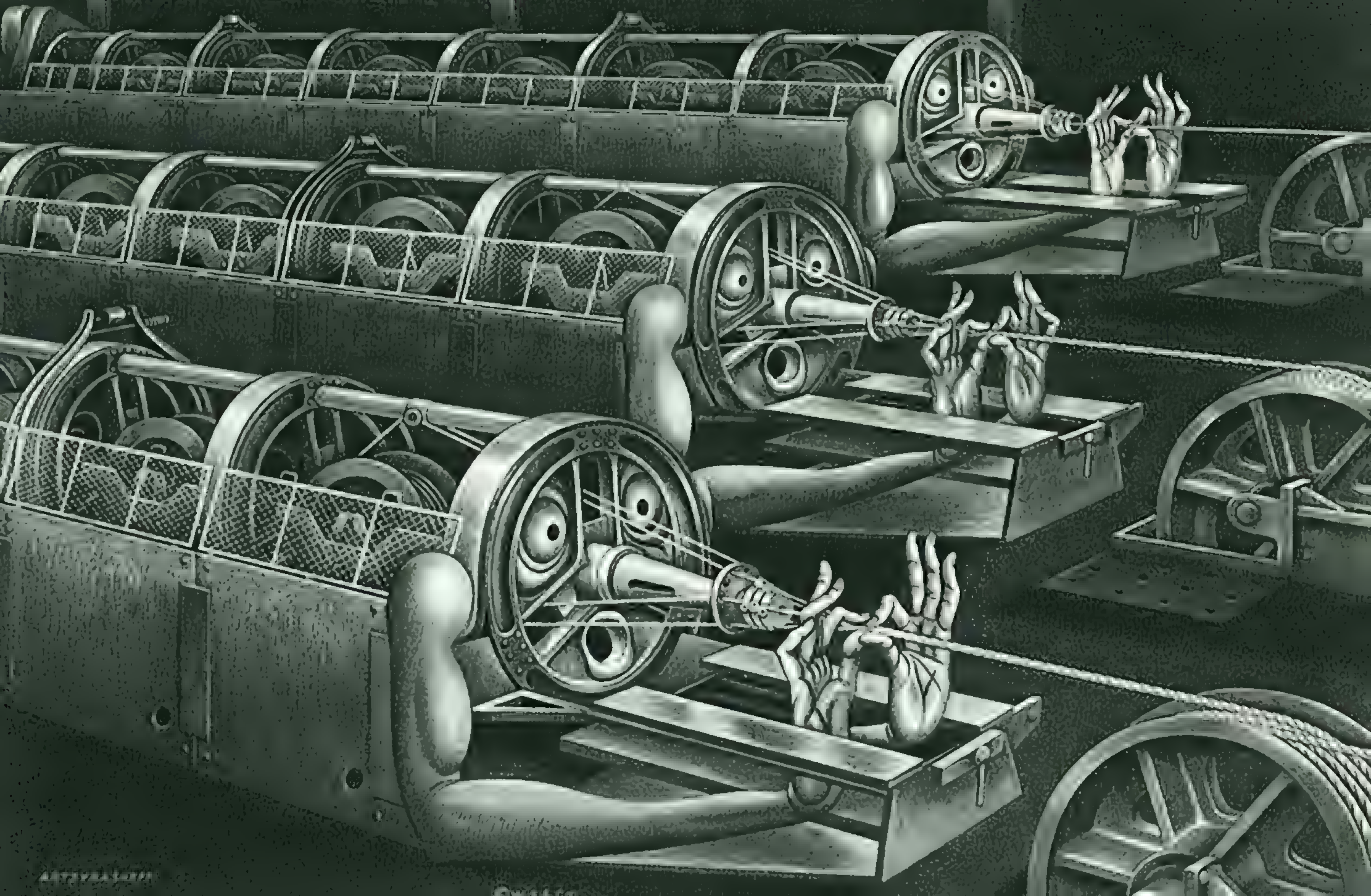

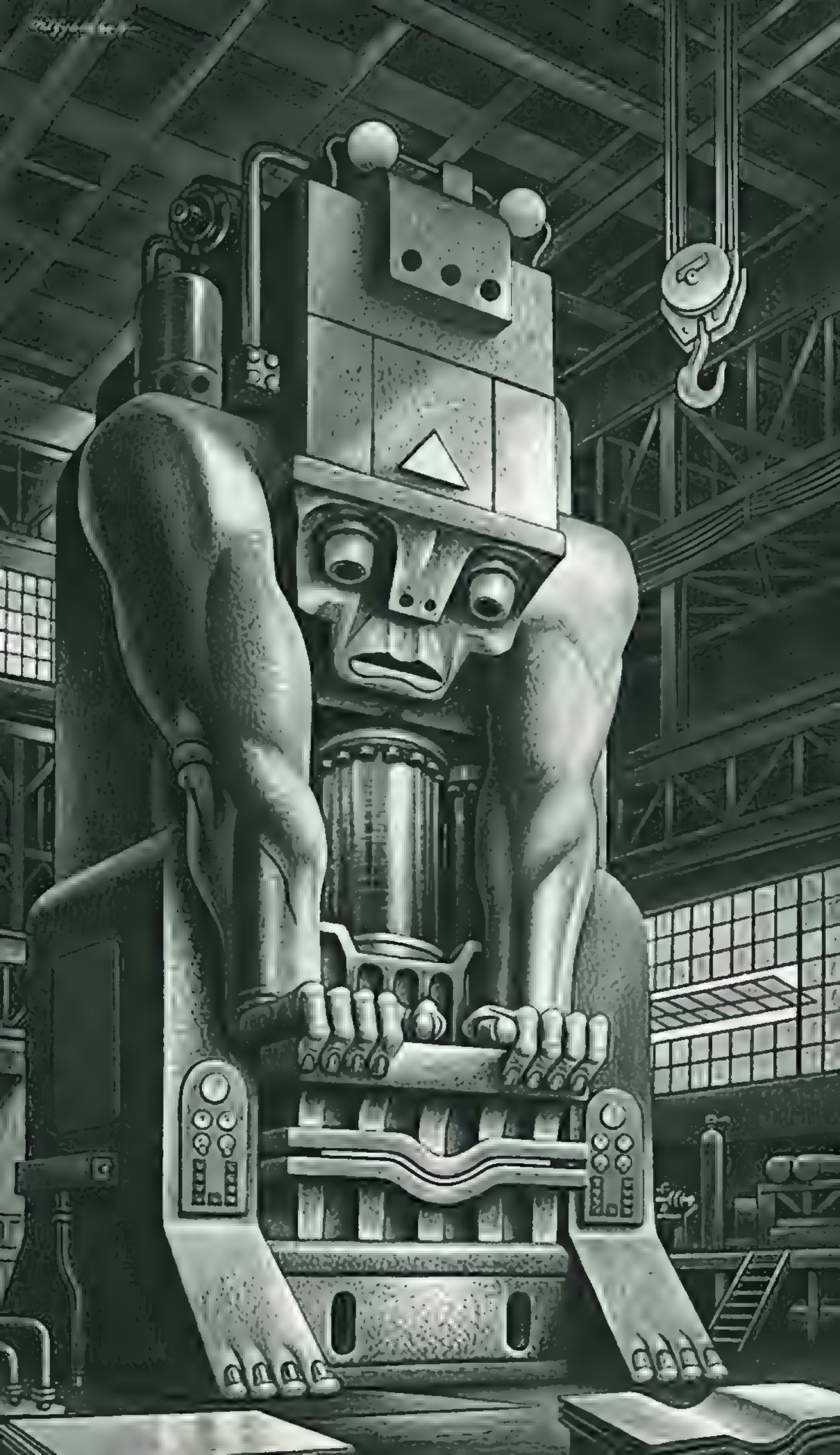

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SCIENCE and MECHANICS

The Magazine That Shows You How

Will 'Flying Saucer' Buses Lick Traffic Congestion?

In this Issue **20 Gifts You Can Make**

Greater Philadelphia's DIVERSIFICATION insures industry its economic stability

Business fares far better in a diversified economy. In Greater Philadelphia, where 400 of the nation's 460 basic industries are represented, business is in a particularly strong position to deal with new economic developments. Among the many other advantages in this area which help to create industrial stability are: huge markets that can be reached overnight, easy accessibility to raw materials, a vast transportation network, and superior research facilities. Add to these factors abundant, low-priced electric power, and you realize why men of vision cannot afford to overlook Greater Philadelphia as the site for their new plant.

PHILADELPHIA ELECTRIC COMPANY

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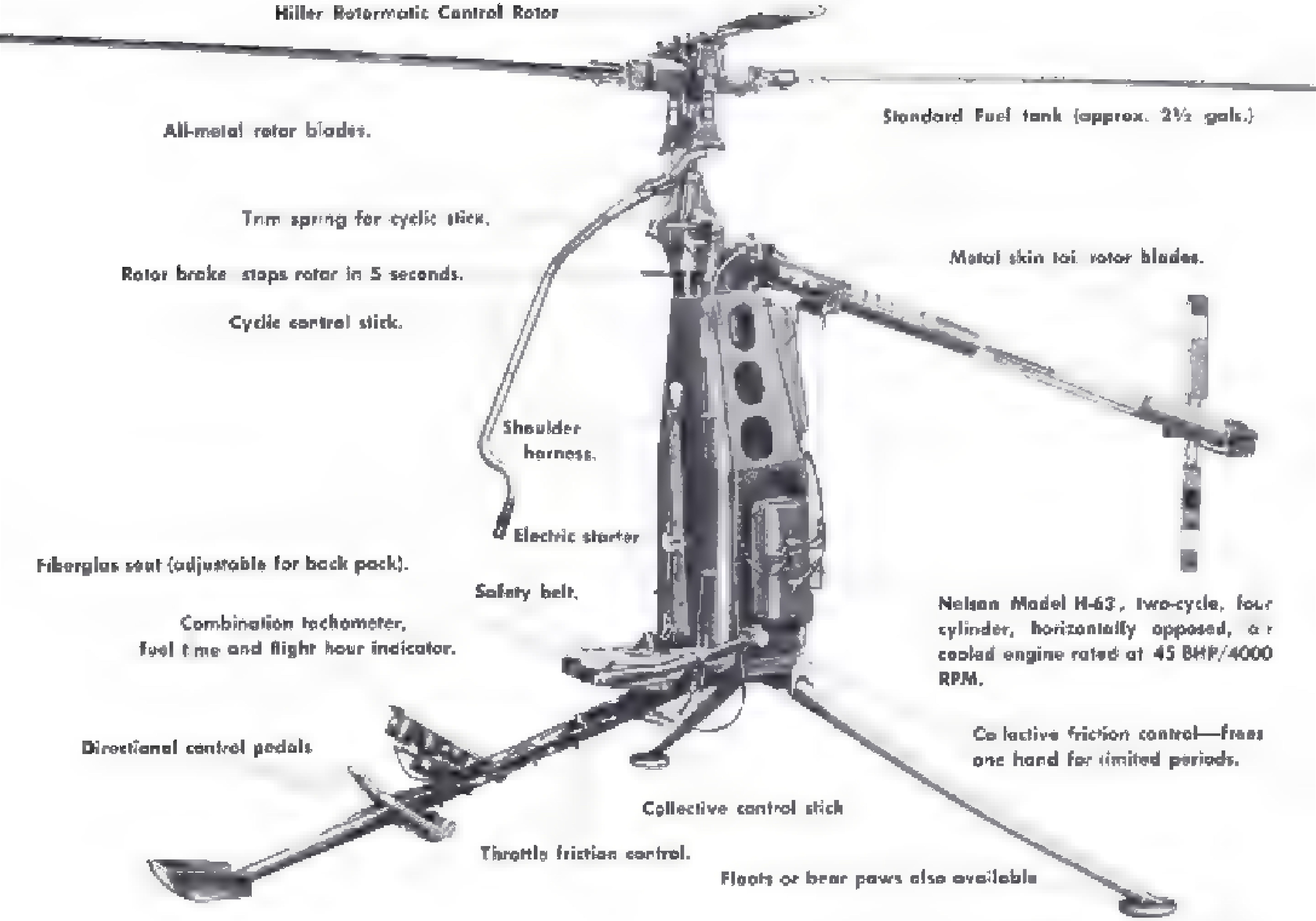
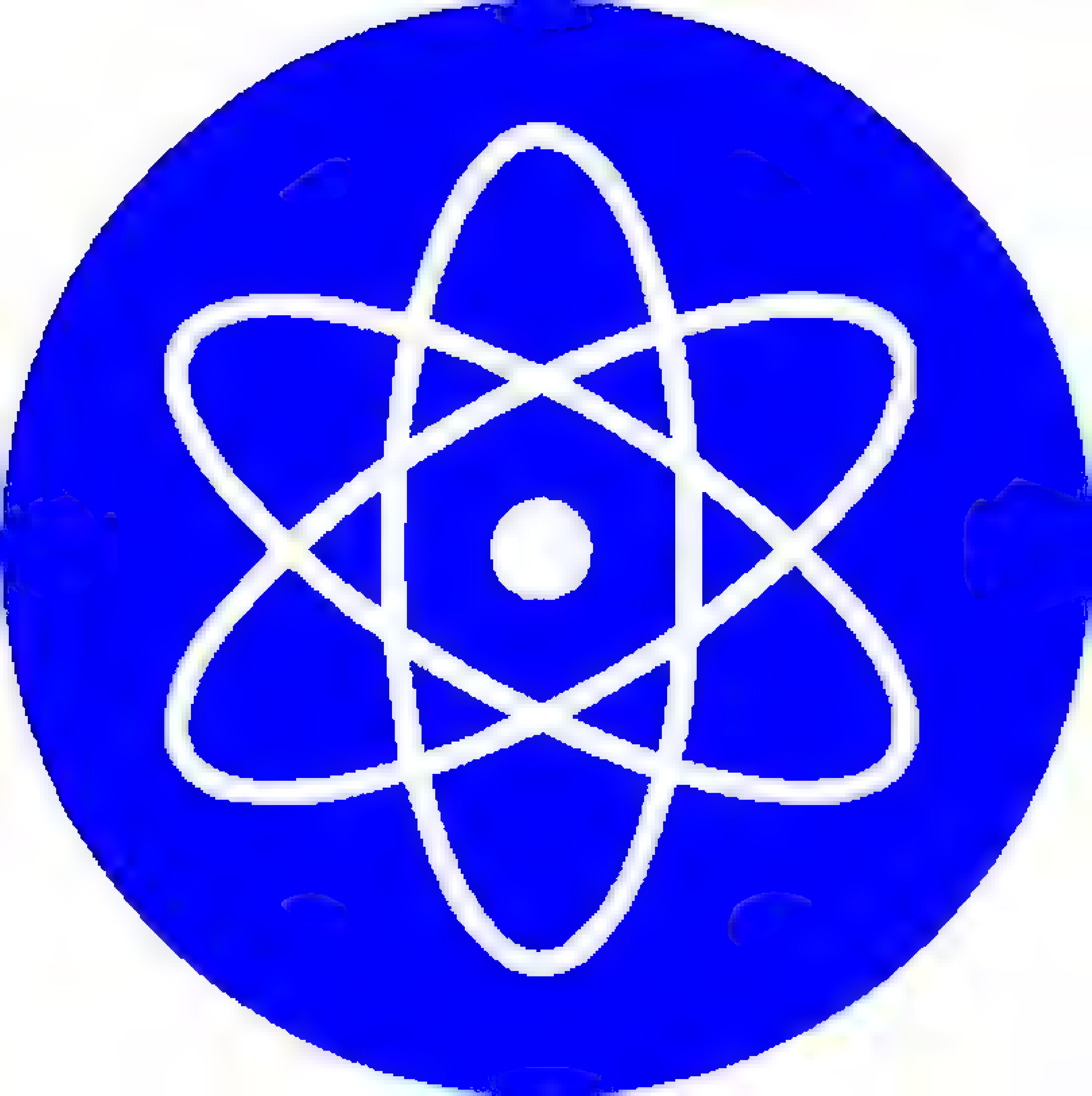
A business-managed, tax-paying utility company owned by more than 100,000 stockholders . . . Serving the world's greatest industrial area, Delaware Valley


Hiller Rotormatic Control Rotor
All-metal rotor blades.
Standard Fuel tank (approx. 2½ gals.)
Trim spring for cyclic stick.
Metal skin tail rotor blades.
Rotor brake stops rotor in 5 seconds.
Cyclic control stick.
Shoulder harness.
Electric starter
Fiberglas seat (adjustable for back pack).
Safety belt.
Combination tachometer, fuel time and flight hour indicator.
Nelson Model H-63, two-cycle, four cylinder, horizontally opposed, air cooled engine rated at 45 BHP/4000 RPM.
Collective friction control—frees one hand for limited periods.
Directional control pedals
Collective control stick
Throttle friction control.
Floats or bear paws also available



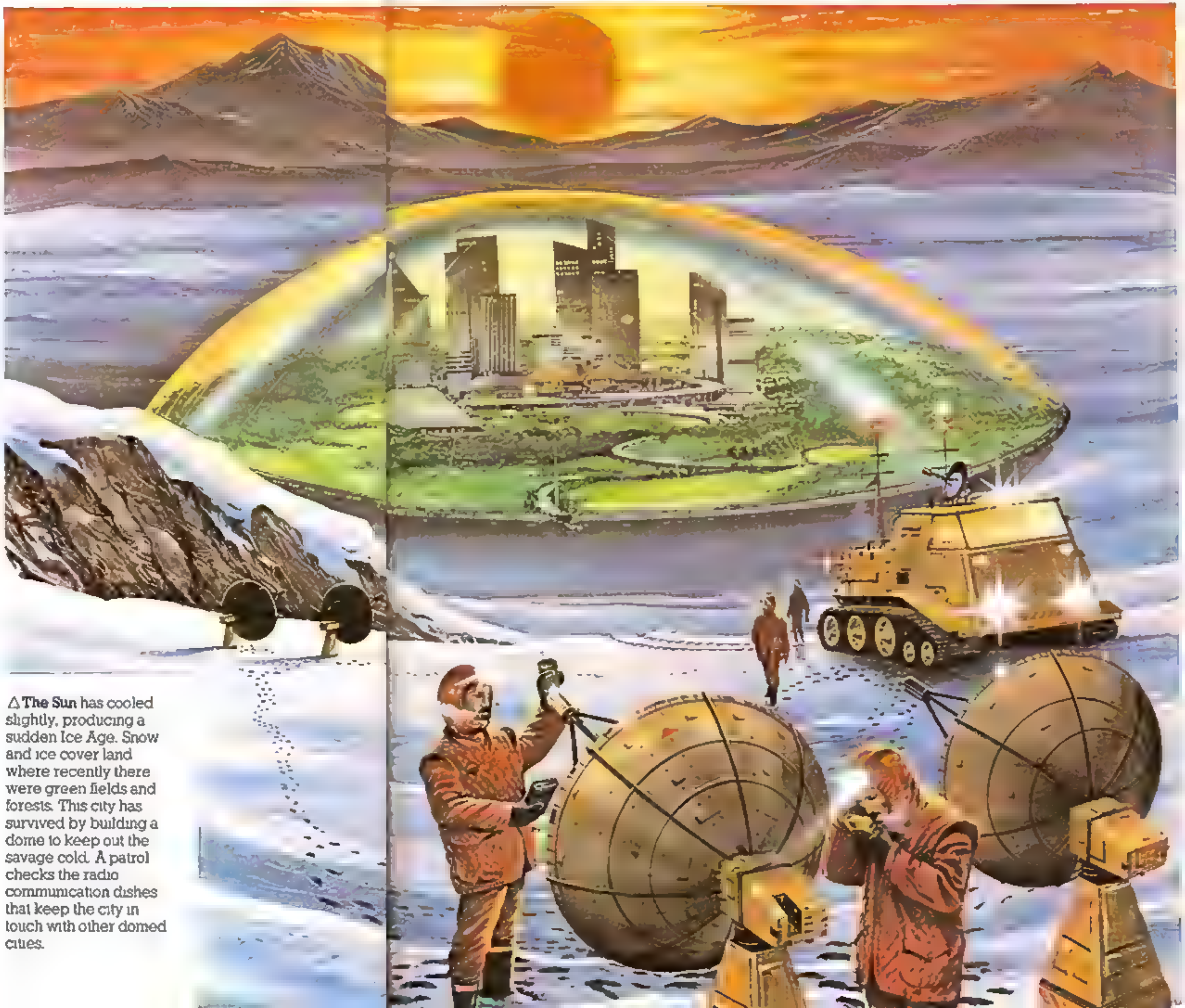
Weather forecast

What is our planet going to be like in the future? From the way in which the Earth moves around the Sun, we have some idea of the kind of weather that both we and our descendants are going to suffer or enjoy. It seems that the climate is going to get colder for the rest of this century; in general, summers will be less warm and winters more severe. Meteorologists expect the next century to be mostly cold, but the weather should improve in about 150 years time!

However, these forecasts could be upset by the Sun, which does not behave in an entirely predictable way. In the 1600s and 1700s, sunspots vanished for about 70 years. The Sun cooled slightly and the weather became very cold, causing rivers to freeze and crops to fail. This could happen again at any time.

Looking further ahead, it is very likely that we shall enter an Ice Age in about 5,000 years or less from now. During the last Ice Age, snow and ice covered the land all the year round over much of Europe and North America. Glaciers reached as far south as London and St Louis. The Ice Age ended about 10,000 years ago, and since then it has been warm. However, over the past few million years, the Earth has suffered a series of long Ice Ages interrupted by short periods of warmth. We are living in one of these warm periods now. When it ends, the Earth will be plunged into another Ice Age lasting possibly 100,000 years.

The continents drift slowly over the face of the Earth, changing its appearance greatly over millions of years. For example, the Atlantic Ocean is now widening and the Pacific Ocean is closing. These movements will affect the Earth's weather. If there is no land at the Poles, then the whole planet will become warm. But the polar ice caps will melt, raising sea level and drowning cities such as New York and London . . . if they still exist.



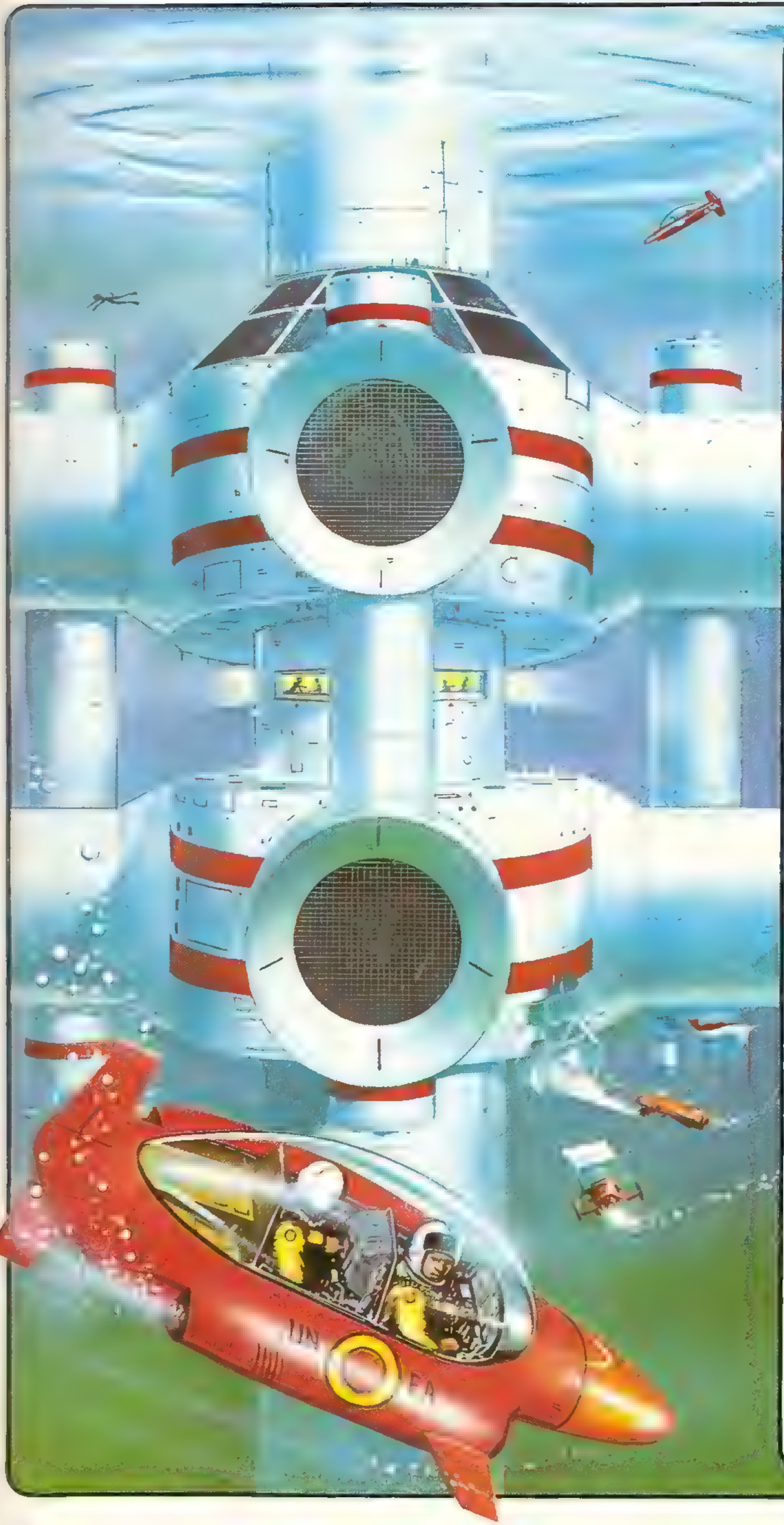
△ **The Sun** has cooled slightly, producing a sudden Ice Age. Snow and ice cover land where recently there were green fields and forests. This city has survived by building a dome to keep out the savage cold. A patrol checks the radio communication dishes that keep the city in touch with other domed cities.

Despite advanced telephone and TV equipment and increased fuel prices, people are still going to travel from place to place in the future. The safety and reliability of transport systems is improving and will continue to improve, but no machine (or the person in charge of it) is perfect, or ever will be: accidents will happen.

On these pages you can see the sort of medical help that could be available to help an accident victim, in this case the burnt and broken-boned driver of a turbocar involved in a road smash.

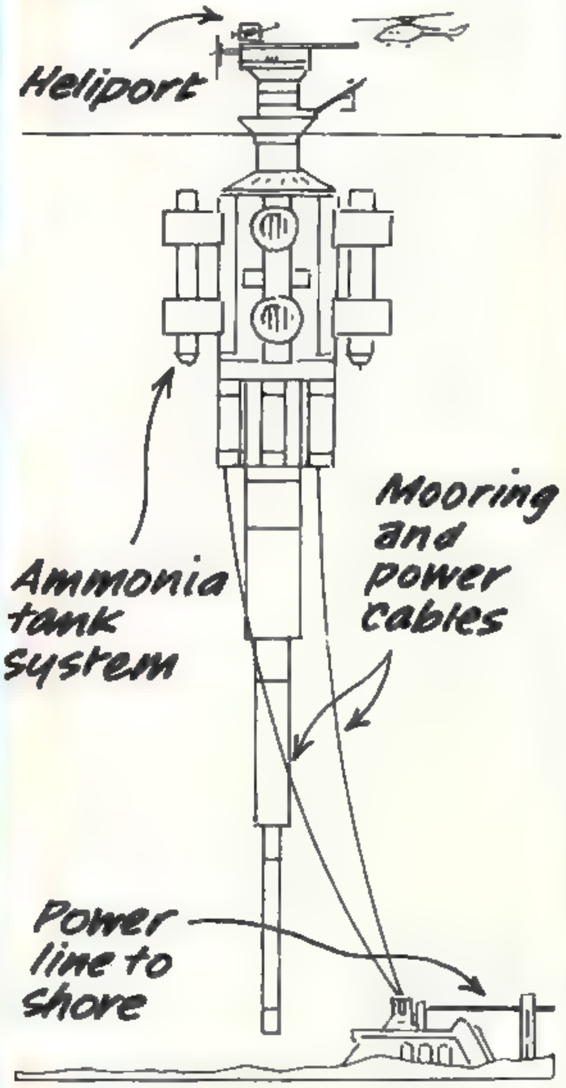
Some of the medical aids are new, others are based on current researches.

1 **Rescue services close in on the burning wreck of a turbine-engined car. As fire-fighting robots under the supervision of human firemen lay flame-quenching foam on the car, the nearest heli-ambulance descends to take care of the driver, still trapped inside the vehicle. After he has been cut out of the wreck, he will be airlifted to hospital.**



Power from the ocean depths

On the left engineers carry out a repair operation on a giant power station of the future. It uses the difference in temperature between warm surface waters and cool deep waters to generate power.



How it works

At the station's core is an ammonia tank. Ammonia needs only a small temperature change to turn from a liquid to a gas and back again.

Warm surface water is pumped around the ammonia tank. As the ammonia warms up it turns into gas. The gas is piped to a turbine, spinning it to generate electricity. Cold water is pumped up from the depths to cool the ammonia, turning it back to a liquid, ready to repeat the cycle once more.

The energy outlook

Energy will be generated by a wide variety of methods in the 21st century. It will be an almost totally electric world, with liquid hydrogen replacing oil as a fuel to power, for example, aircraft and cars.

How the atom is putting new shapes on the horizon

In a few years, shapes like these on the horizon may well be trademarks of the atomic age—trademarks of the atom at peaceful work, producing electricity for the nation's homes, farms, factories and businesses.

Already, America's independent electric companies are participating in building three big commercial atomic-electric power plants. Four more such plants are under way. All told, more than 300 million dollars from the electric companies will be involved, and hundreds of electric company engineers and scientists are pressing research into all aspects of this vast new field.

There is much still to be learned about making the atom work efficiently and economically for you. And the experience, ingenuity and inventiveness of the independent electric companies are at work with other industries and with the Atomic Energy Commission to find answers.

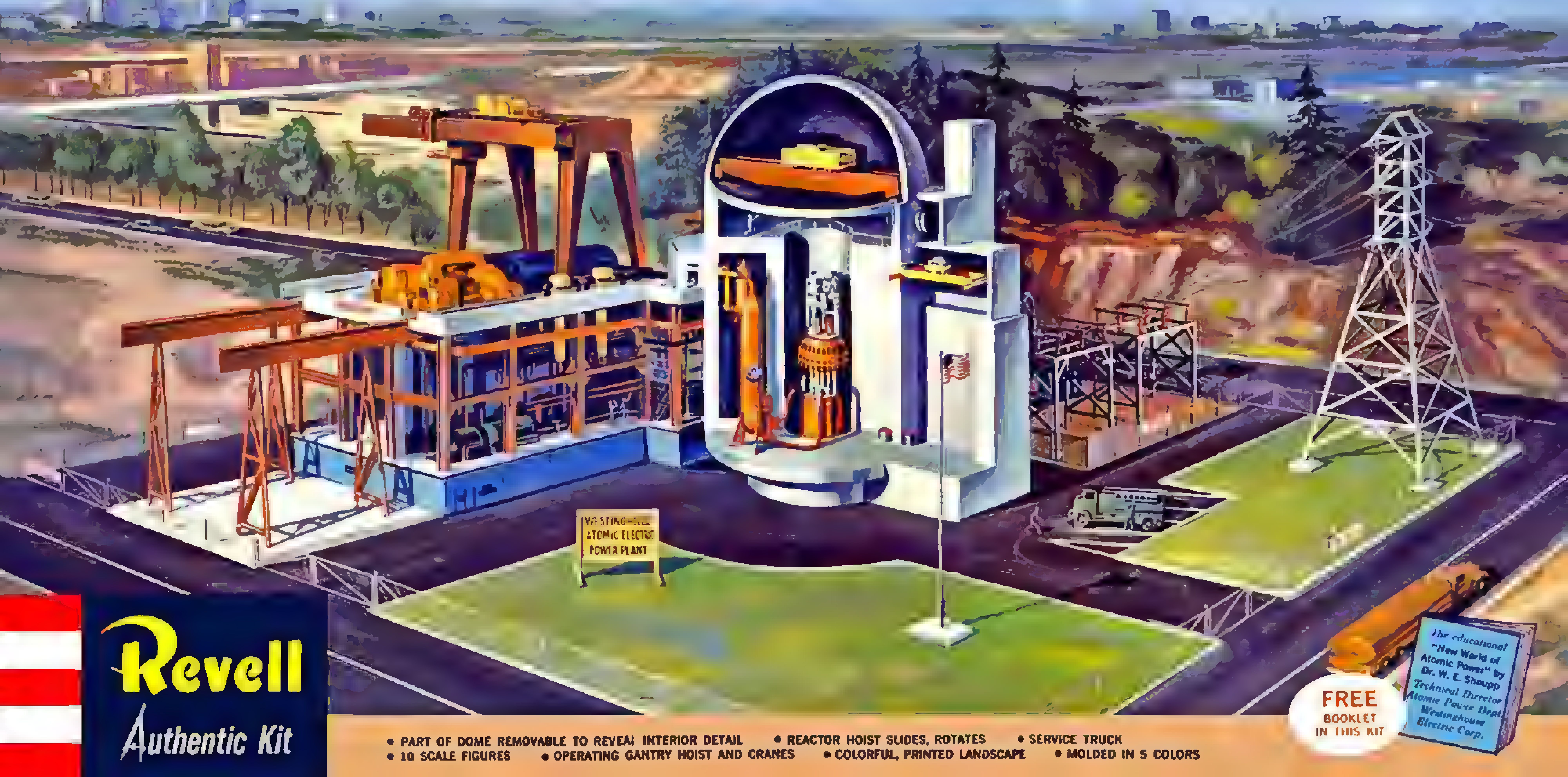
America's electric light and power companies have brought electricity to almost every corner of the U.S. in the span of a single lifetime. You can be sure they'll help develop the atom's promise so this nation will continue to have the best and the most electric service in the world.

AMERICA'S INDEPENDENT ELECTRIC LIGHT AND POWER COMPANIES*

*Names on request from this magazine

WESTINGHOUSE ATOMIC POWER PLANT

CHANGES NUCLEAR ENERGY INTO ELECTRIC POWER



- PART OF DOME REMOVABLE TO REVEAL INTERIOR DETAIL
- REACTOR HOIST SLIDES, ROTATES
- SERVICE TRUCK
- 10 SCALE FIGURES
- OPERATING GANTRY HOIST AND CRANES
- COLORFUL, PRINTED LANDSCAPE
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POPULAR SCIENCE

MONTHLY

DEC. 1947
25 CENTS

Diving Balloon
p. 82

AUGUST 1964 35 CENTS

Popular Science Monthly

Can Those Gadgets Save You Gas?

Sensational Findings from PS' Own Tests

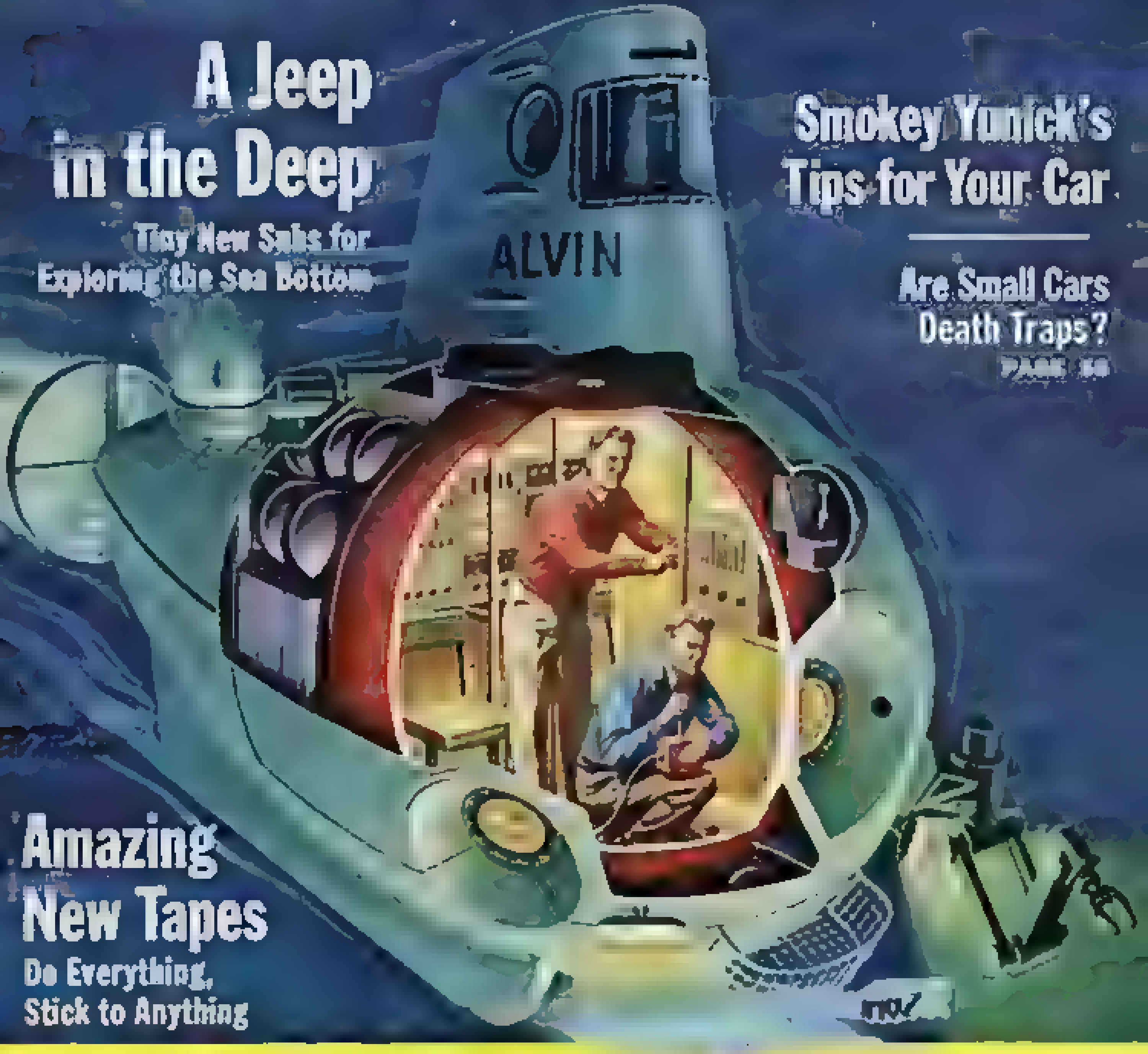
A Jeep in the Deep

Tiny New Subs for Exploring the Sea Bottom

Smokey Yunick's Tips for Your Car

Are Small Cars Death Traps?

PAGE 60



Amazing New Tapes

Do Everything, Stick to Anything

PLUS Adapted from the New $4.50 Best-Seller on Project Apollo:

Man to the Moon

PS Puts You in the Pilot's Seat

Christmas Fun with Electronic Robots

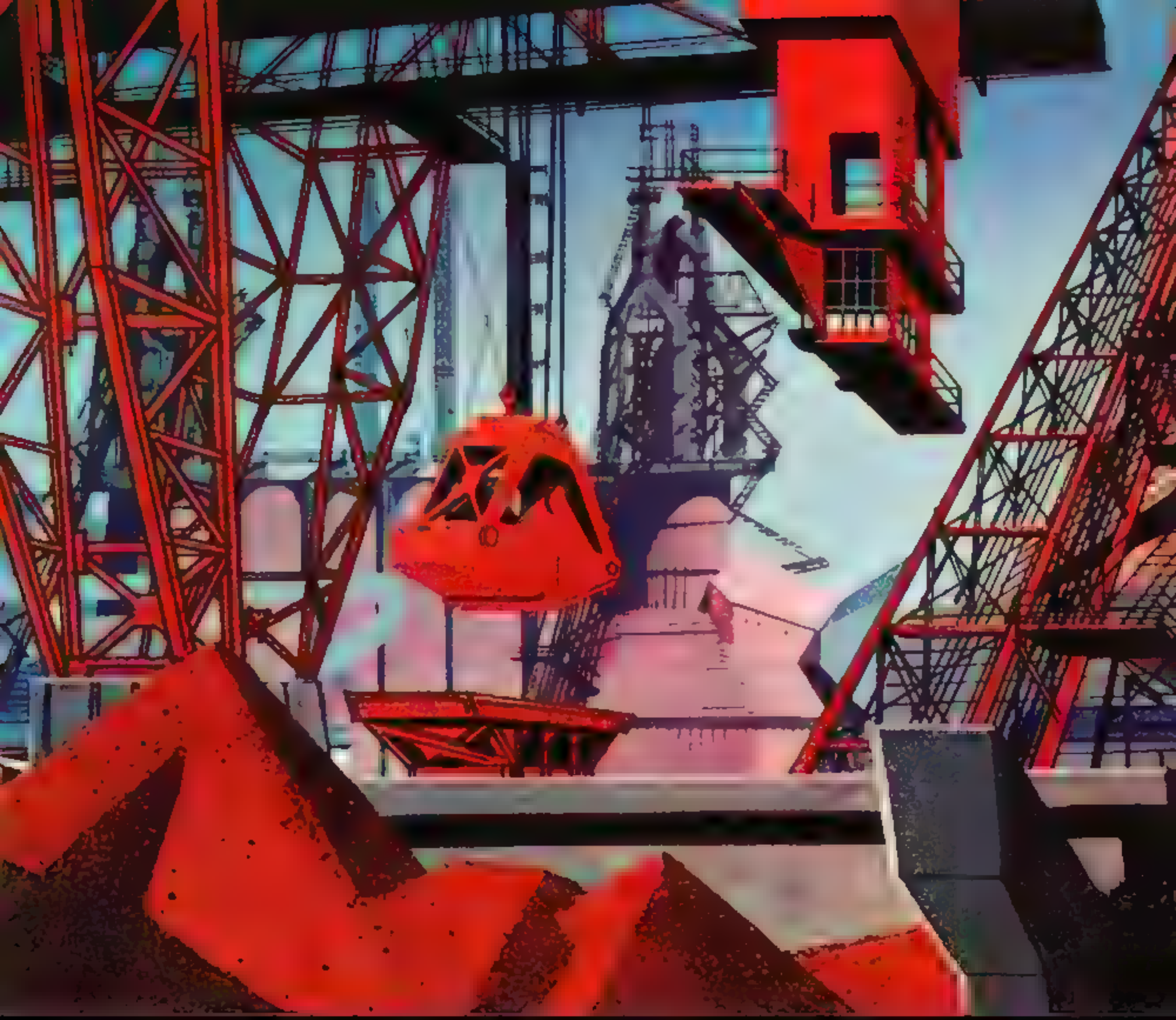
POPULAR ELECTRONICS

DECEMBER 1958

35 CENTS

Hi-Fi from Your Ceiling • Long-Wave Set

Electronic Simulators Train Jetliner Pilots



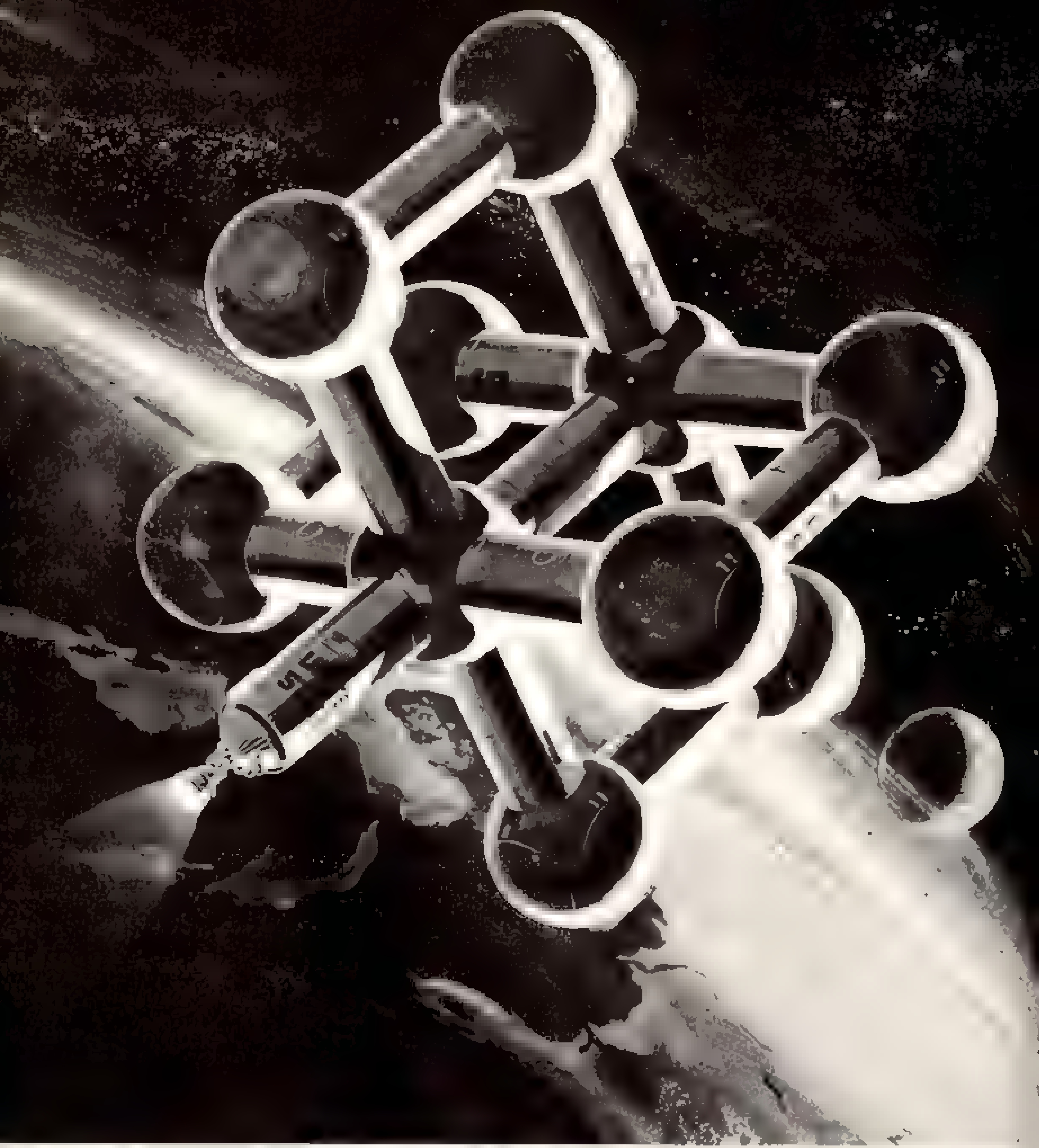
The Treasure from Outer Space

Rhapsody of STEEL

Score, sound track, and
scenes from the motion picture
produced by John Sutherland
Productions, Inc., and presented by
United States Steel

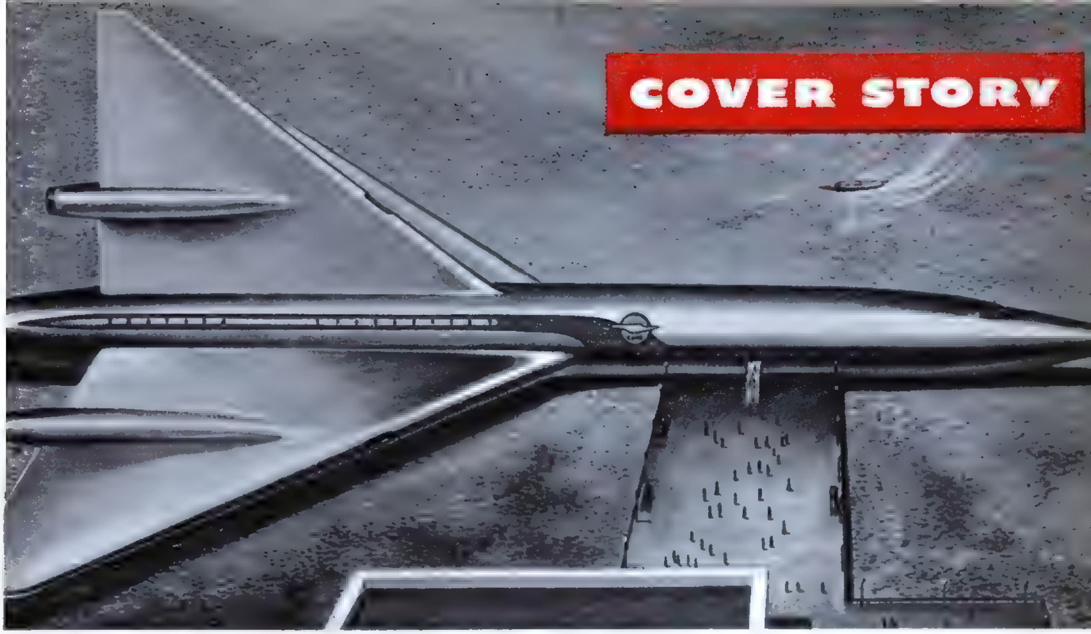
USS

Steel



Douglas Air

Its series of spheres and cylinders firmly bolted together, a Spaceball station is moved into its final earth orbit by rocket engine in one of the stages. Instead of the 2–8-man crews of MOL and other laboratories of the 1960s, Spaceball is manned by dozens of astronauts and scientists. If desired, such a station could also be powered out of earth orbit and into a trajectory to another planet.

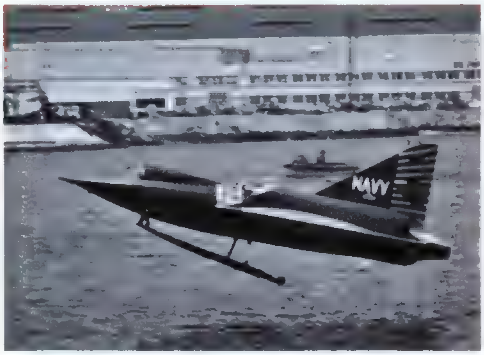


COVER STORY

AIR-SEA JETLINER

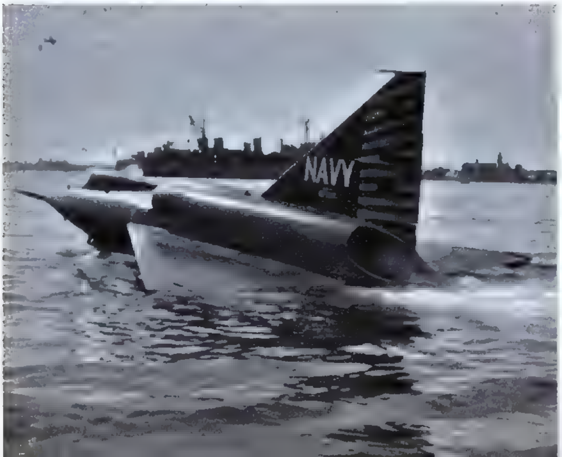
AFTER months of top-secret tests, the Navy has partially lifted the wraps on its XF2Y-1 Sea-Dart, world's first delta-wing seaplane, which uses retractable hydro-skis for take-off and landing.

MI's cover and the Convair drawing above show what this sensational development may mean to commercial air travel of the future. Imagine a supersonic jetliner, too large to be handled efficiently at even our largest airports but perfectly capable of squatting at any of our innumerable seaports and being nuzzled to its dock by tugs! In addition to passenger convenience and greater capacity is the extra safety factor in trans-oceanic hops.

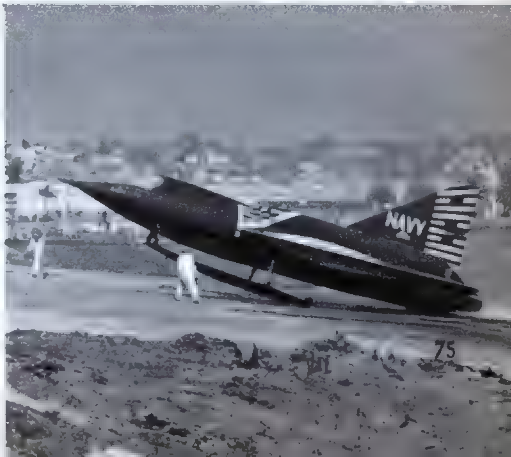


Hydro-skis, shown extended immediately after water take-off, retract when plane is in flight.

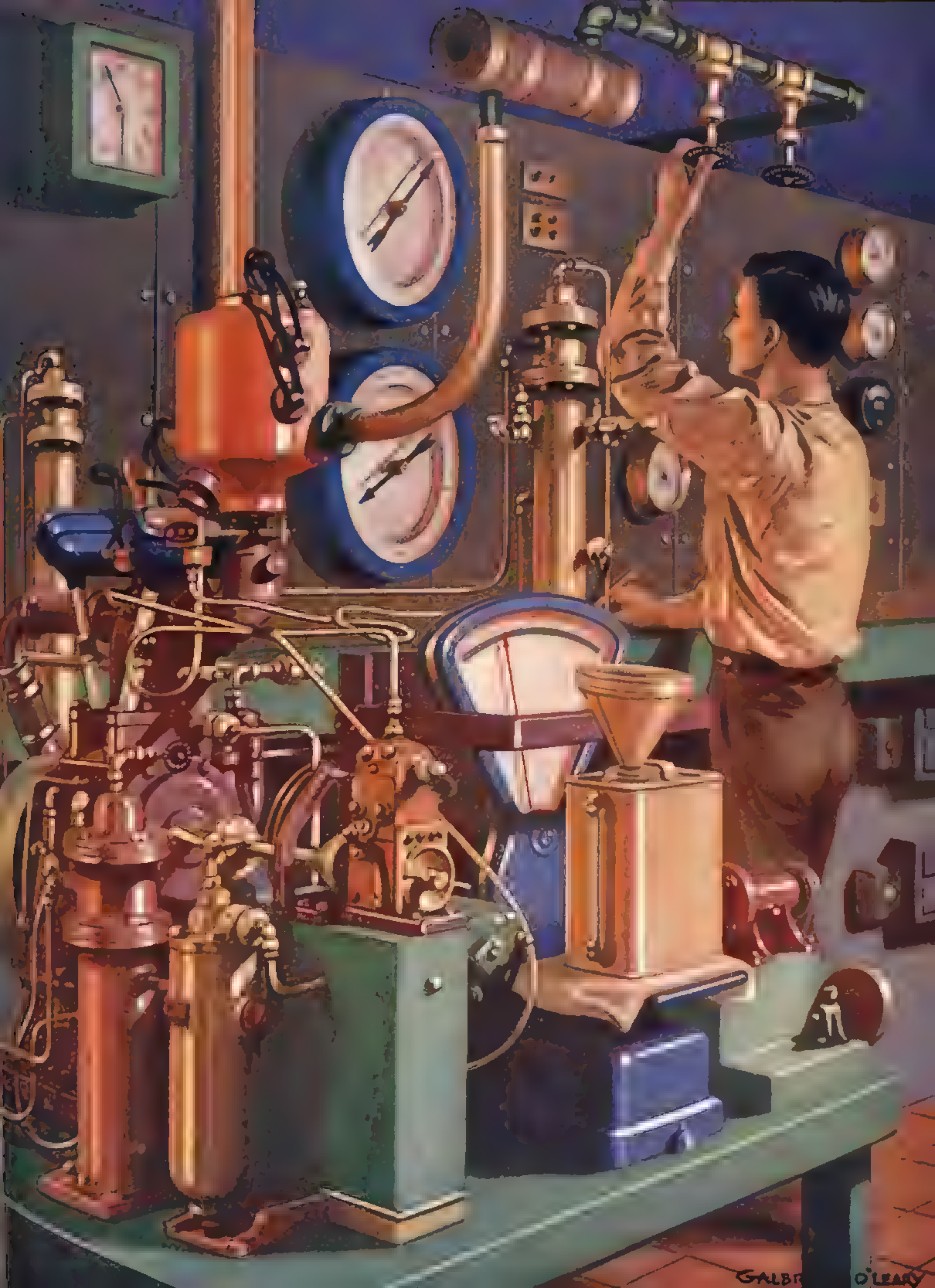
The Sea-Dart ready for take-off. Wings and tail are triangular. Elevons take place of ailerons.



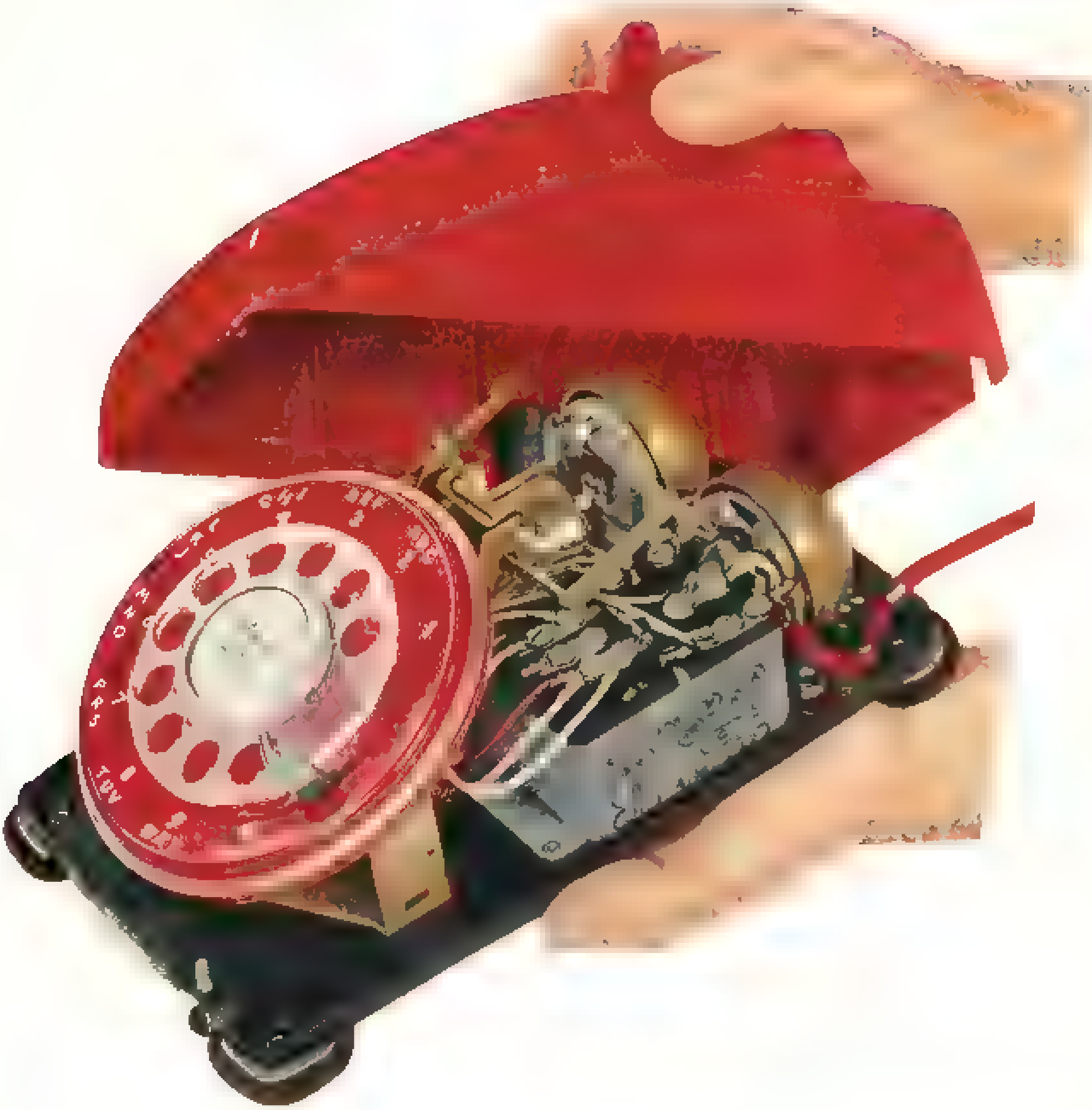
Convair's new fighter needs no special beaching gear. It runs up on its skids and own power.



B&CO


GALBR O'LEARY

our friend the ATOM



Undercover Story

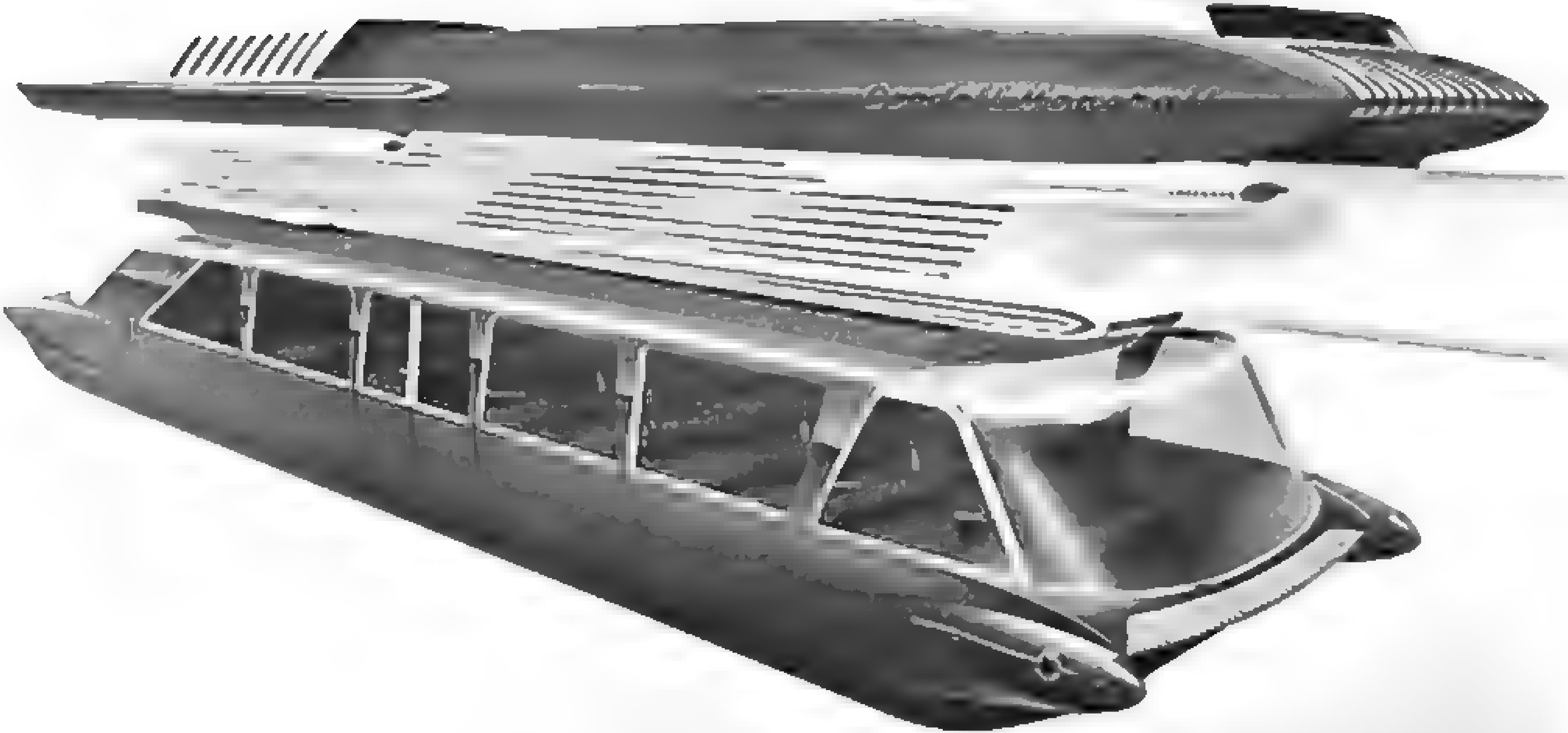
This is the business end of a Bell telephone made by Western Electric. It's one of the most precisely engineered products in your home.

But the telephone instrument itself is only a tiny part of the equipment we make that's needed to provide telephone service—millions of miles of interconnected wire and cable, intricate switching systems in more than 10,000 Bell telephone central offices. All of this equipment must be skillfully engineered, efficiently produced and—in the case of central office equipment—installed by Western Electric people so it will function instantly and perfectly every time it's called upon.

This is a big part of Western Electric's job as the manufacturing and supply unit of the Bell System. And an important reason why you are able to take good, dependable telephone service for granted.

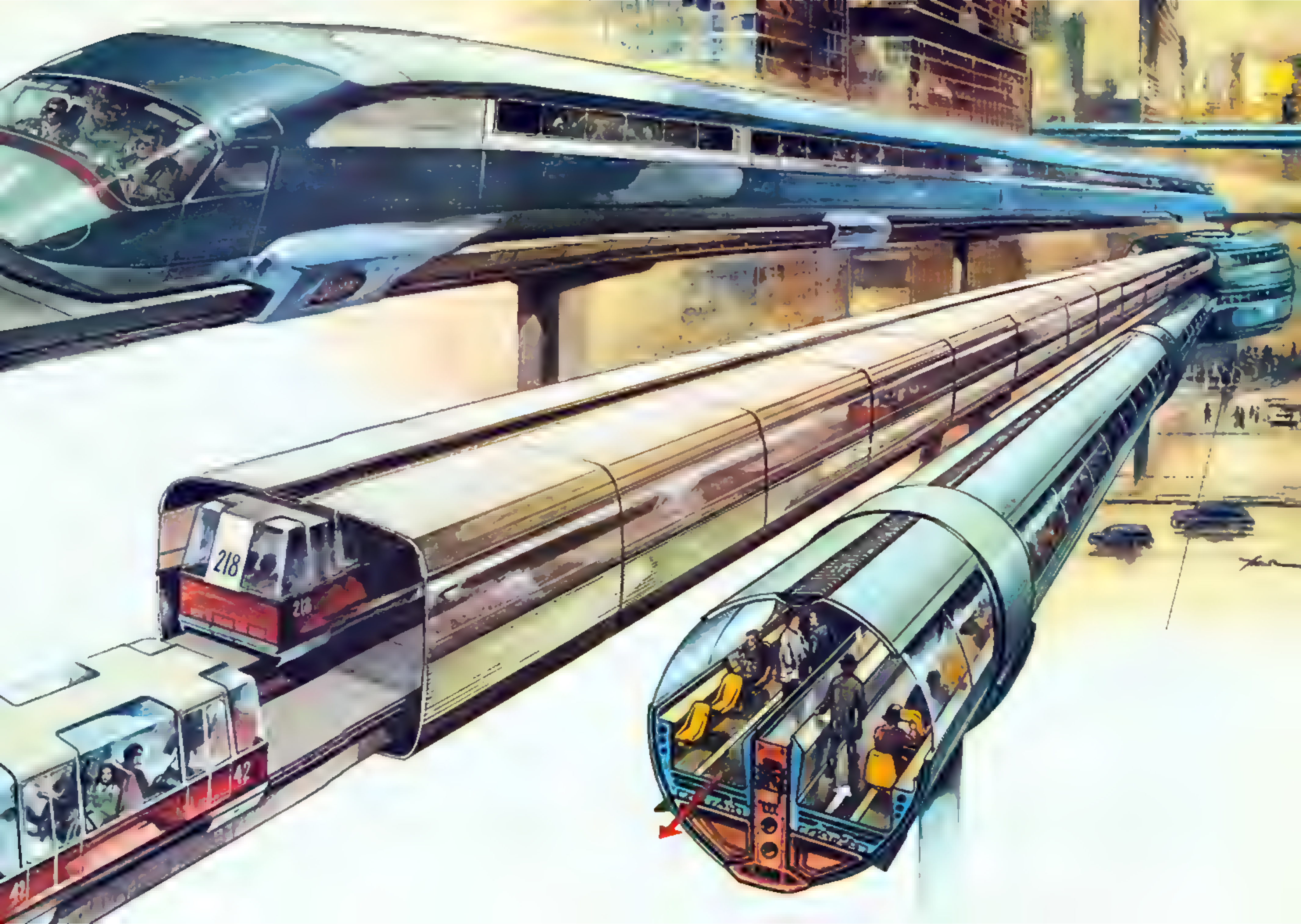
Western Electric

MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM



MONORAIL COACH

BY MITCHELL GOODELL MONORAIL


218
218
42
42

When the patient

lashes out against "them"—

THORAZINE®

brand of chlorpromazine

quickly puts an end to his

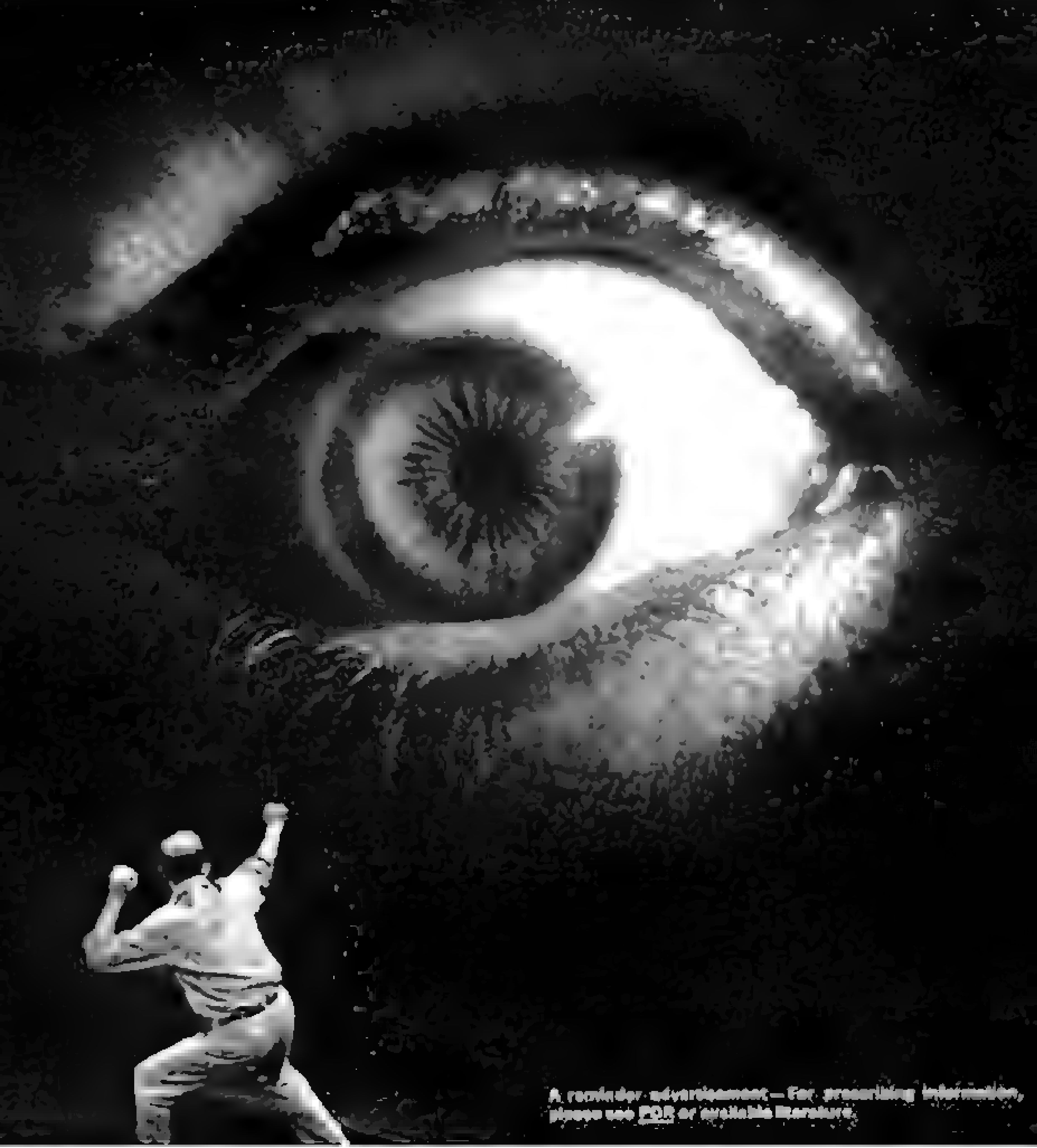
violent outburst

'Thorazine' is especially effective when the psychotic episode is triggered by delusions or hallucinations.

At the outset of treatment, Thorazine's combination of antipsychotic and sedative effects provides both emotional and physical calming. Assaultive or destructive behavior is rapidly controlled.

As therapy continues, the initial sedative effect gradually disappears. But the antipsychotic effect continues, helping to dispel or modify delusions, hallucinations and confusion, while keeping the patient calm and approachable.

SKF SMITH KLINE & FRENCH LABORATORIES
leaders in psychopharmaceutical research



A reminder advertisement—For prescribing information, please see PDR or available literature.

SIMPLE AND EFFICIENT—The ***Bell Solar Battery*** is made of thin, specially treated strips of silicon, an ingredient of common sand. It needs no fuel other than the light from the sun itself. Since it has no moving parts and nothing is consumed or destroyed, the ***Bell Solar Battery*** should theoretically last indefinitely.

New Bell Solar Battery Converts Sun's Rays Into Electricity

Bell Telephone Laboratories demonstrate new device for using power from the sun

Great and kindly is the sun. Each day it bathes the earth in light, bringing life to everything on earth.

Scientists have long reached for the secret of the sun. For they have known that it sends us nearly as much energy daily as is contained in all known reserves of coal, oil and uranium.

If this energy could be put to use there would be enough to turn every wheel and light every lamp that mankind would ever need.

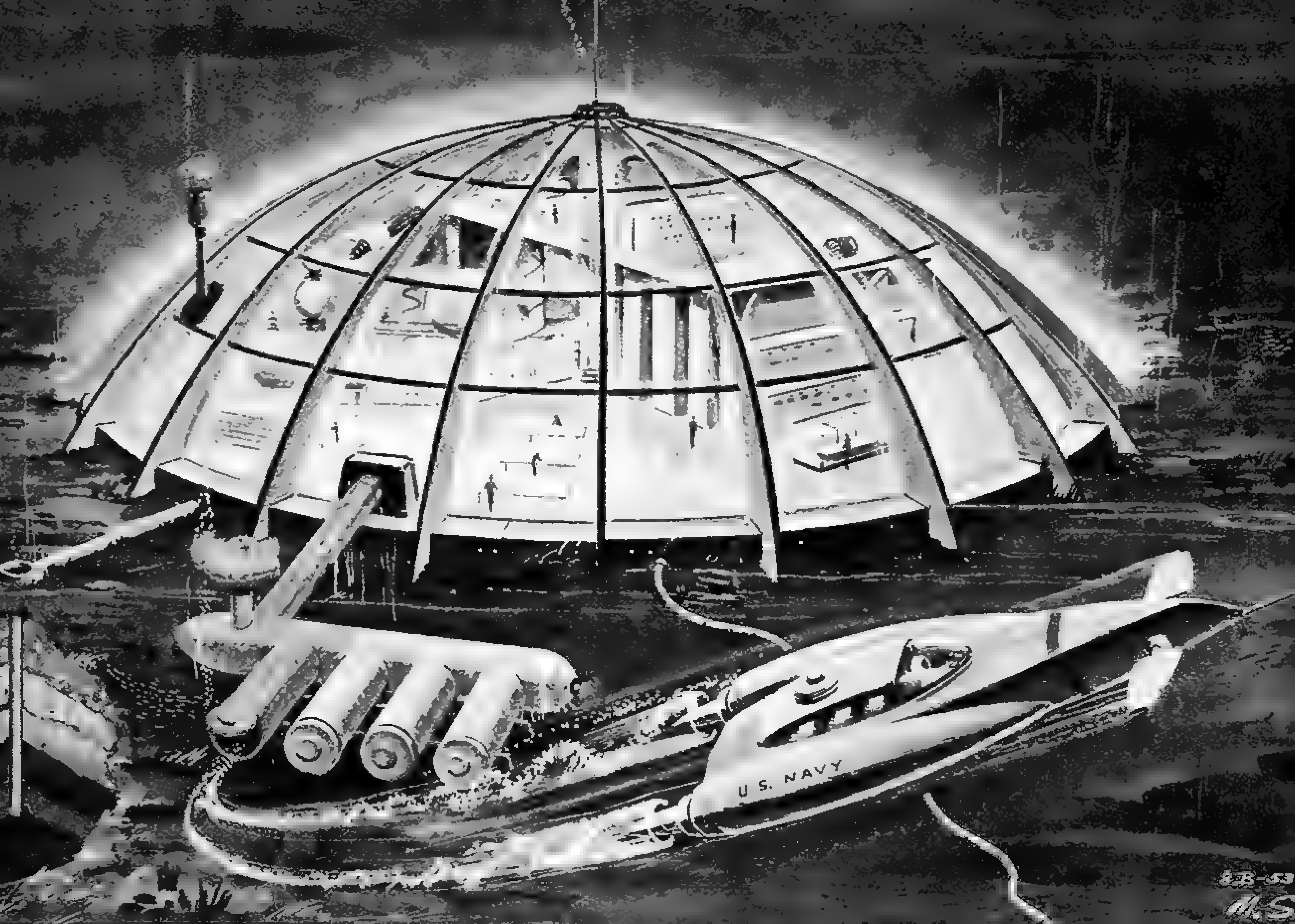
Now the dream of the ages is closer to realization. For out of the Bell Telephone Laboratories has come the ***Bell Solar Battery***—a device to convert energy from the sun directly and efficiently into usable amounts of electricity.

Though much development remains to be done, this new battery gives a glimpse of future progress in many fields. Its use with transistors (also invented at Bell Laboratories) offers far-reaching opportunities for improvements and economies in telephone service.

A small ***Bell Solar Battery*** has shown that it can send voices over telephone wires and operate low-power radio transmitters. Made to cover a square yard, it can deliver enough power from the sun to light an ordinary reading lamp.

Great benefits for telephone users and for all mankind will come from this forward step in harnessing the limitless power of the sun.

BELL TELEPHONE SYSTEM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UNIVERSAL ATLAS CEMENTS

TOMORROW'S BRIDGE: giant spans of concrete

"These twin spans of prestressed concrete carry a thruway across a river at minimum cost, eliminating piers, reducing weight, keeping thruway lanes separated. Construction is simplified, since a single set of forms can be used to cast concrete for both spans. And for a large-scale highway program, bridge sections can be mass-produced for any number of bridges. Spans as long as one-fifth of a mile can be supported by the arches wedged within the river banks. Such practical, economical designs can now be realized in adaptable concrete."

DESIGNERS. Myron Goldsmith & James D. Ferris—*Skidmore, Owings & Merrill, Architects and Engineers*
CONSULTANT: Prof T. Y. Lin *University of California*

■ When such concrete structures of tomorrow are built, Universal Atlas will supply, as now, a major share of the essential building material—cement.

USS TRADE MARK

UNIVERSAL ATLAS CEMENT COMPANY, 100 Park Ave , New York 17, N. Y. MEMBER OF THE INDUSTRIAL FAMILY THAT SERVES THE NATION—**UNITED STATES STEEL**

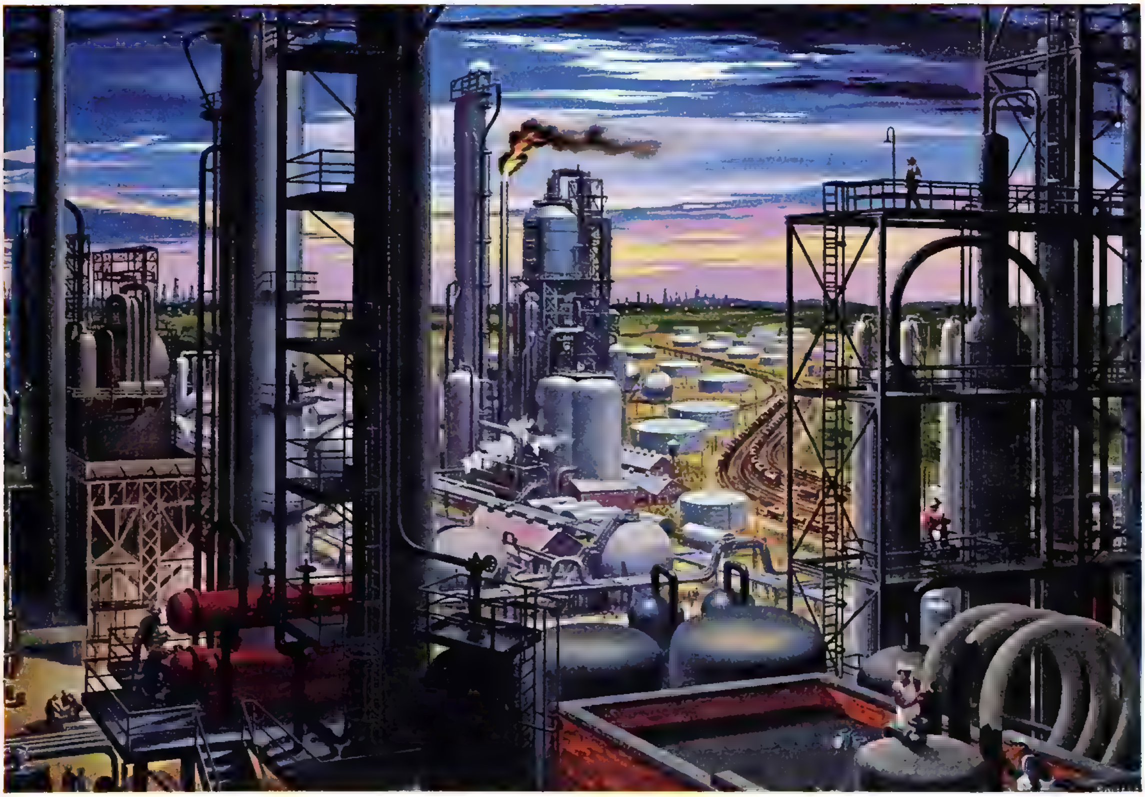
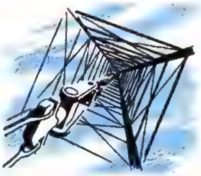


Illustration courtesy of Armstrong Cork Company, makers of Industrial Insulation

In an oil refinery the BTU is king

1 Heat supply and removal are mighty tasks in an oil refinery. Most processes, Thermofor catalytic cracking, for example, depend on quick temperature changes. High heat to release precious vapors, rapid cooling to condense and capture them. In both cases, air under high pressure, provided by American Blower Centrifugal Compressors, does much of the work. Our heating and cooling coils, too, serve in vital heat transfer processes.

2 Ample power is essential for round-the-clock refinery operations. American Blower Mechanical Draft Fans are designed and proportioned for steam plant needs—are now used on 1,000,000 #/hr. boilers by leading public utilities.



3 In drilling operations, American Blower Gýrol Fluid Drives not only improve the performance of hoists and slush pumps but also provide a stable drive for the rotary table. They protect machinery, save time and money.

4 If you're planning a plant modernizing program let American Blower supply you with the proper air handling products to improve comfort, boost efficiency. Contact our nearest branch office, located in all principal cities.

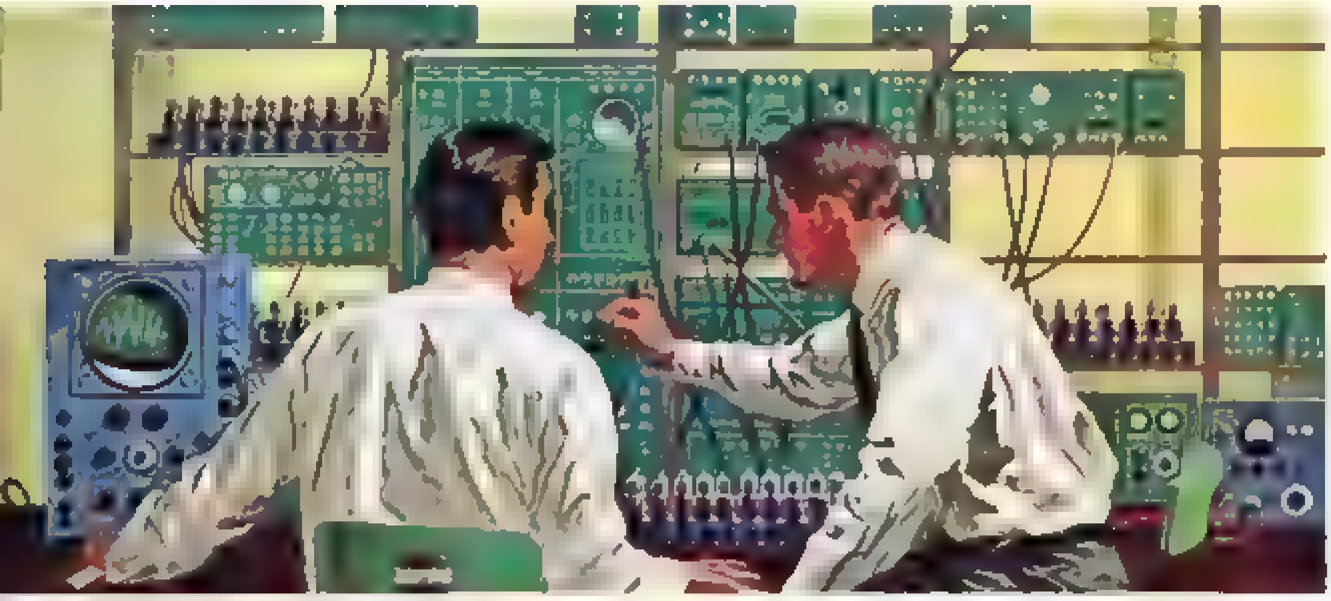
American Blower Centrifugal Compressors, incorporating advance-design features, efficiently deliver large volumes of air or gases at high pressure.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN • CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

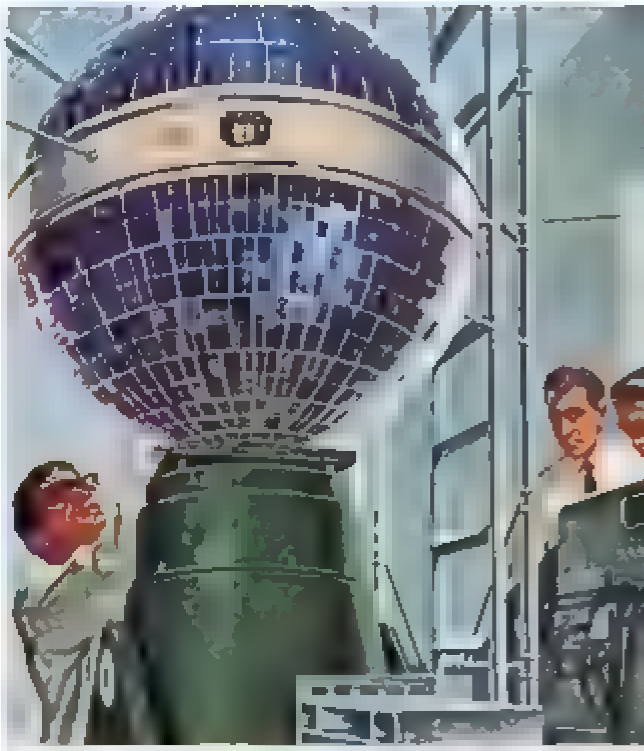
AMERICAN BLOWER

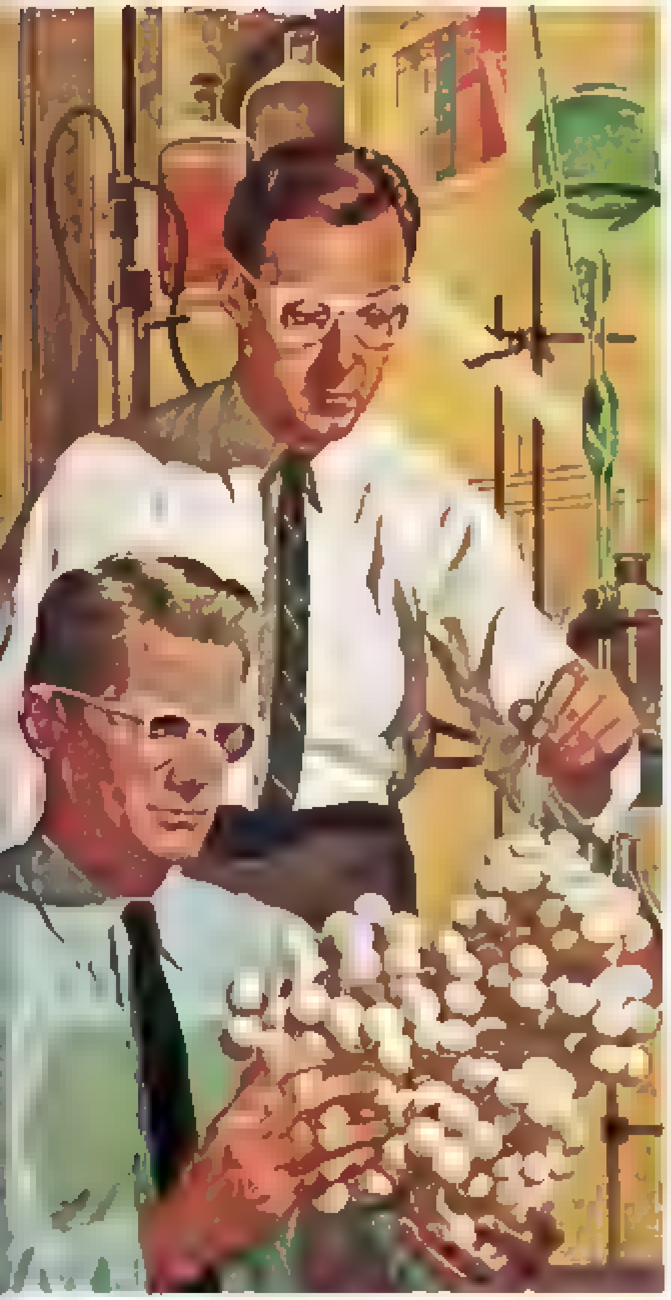
Serving home and industry: **AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS**

Vast research aids industry in Greater Philadelphia



ELECTRONICS AND COMMUNICATIONS





CHEMISTRY AND MEDICINE

Few places have a concentration of research facilities so large as those available in Greater Philadelphia. Established here are extensive scientific centers, which place the best talent and equipment to be found anywhere within easy reach of area industries. This important advantage, added to a widespread transportation network, skilled manpower, a huge nearby market, access to raw materials, and ample, fairly priced electric power, assures growing prosperity for Greater Philadelphia, and makes it an outstanding location for your business.

NEW METALS

Philadelphia Electric Company

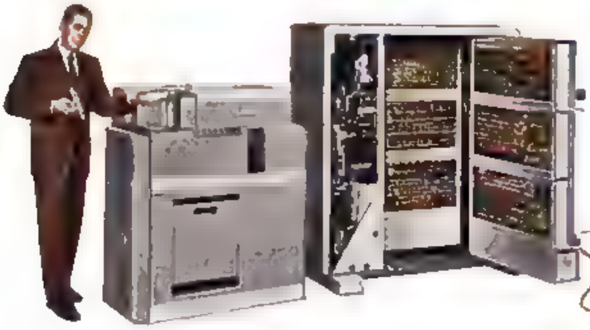
An investor-owned company with more than 100,000 stockholders   Serving the world's greatest industrial area Delaware Valley

150 Extra Engineers

An IBM Electronic Calculator speeds through thousands of intricate computations so quickly that on many complex problems it's like having 150 EXTRA Engineers.

No longer must valuable engineering personnel . . . now in critical shortage . . . spend priceless creative time at routine repetitive figuring.

Thousands of IBM Electronic Business Machines . . . vital to our nation's defense . . . are at work for science, industry, and the armed forces, in laboratories, factories, and offices, helping to meet urgent demands for greater production.



IBM

INTERNATIONAL BUSINESS MACHINES

[illegible] December 195

336 Thanksgivings ago

Distance meant danger . . .

Half a mile from the sheltering stockade was half a world away.

Today, Houston, Chicago or Manila are as close as your telephone. What other man-made miracle unites us so strongly? Or so effectively? Or so economically?

The slim, far flung wires of your telephone weave a web that holds the world together.

Can't be home for Thanksgiving?
Do the next best thing. Telephone.
And call early to make sure
your call gets through quickly.

GENERAL TELEPHONE SYSTEM

ONE OF AMERICA'S GREAT COMMUNICATIONS SYSTEMS • 260 MADISON AVENUE, NEW YORK, N. Y.

"on the beam"

Telephone service without wires. Your voice is airborne!
More and more, General Telephone employs
modern electronics to increase efficiency, keep costs down.
Now microwave relays, spaced horizons apart,
beam millions of messages from one tower to another.
Practically stormproof . . . able to accommodate
vast future growth . . . these fabulous voiceways are
built today with tomorrow in mind.
Still another example of practical vision in
the 30 states where General Telephone operates.
Telephone progress never stops.

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TWENTY-FIVE CENTS FEBRUARY 23, 1959

TIME
THE MAGAZINE

THE TELEPHONE MAN

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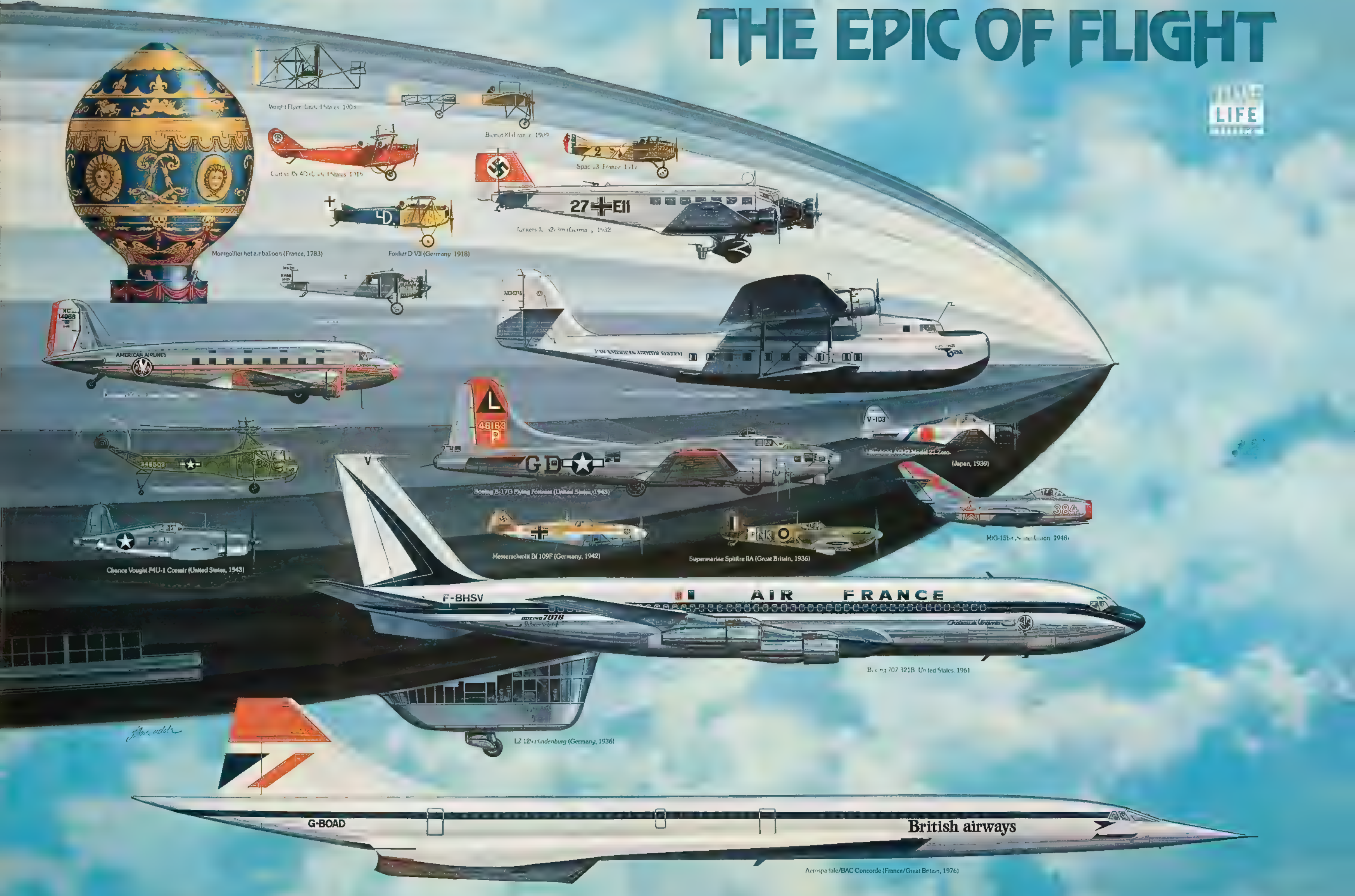
VOL. LXXIII NO. 8

THE EPIC OF FLIGHT

LIFE


Montgolfier hot air balloon (France, 1783)
Wright Flyer (United States, 1903)
Blériot XI (France, 1909)
Curtiss JN-4D (United States, 1916)
Spad 13 (France, 1917)
Fokker D VII (Germany, 1918)
Junkers Ju 52/3m (Germany, 1932)
PAN AMERICAN AIRWAYS SYSTEM
AMERICAN AIRLINES
NC 14988
Boeing B-17G Flying Fortress (United States, 1943)
Mitsubishi A6M2 Model 21 Zero (Japan, 1939)
MiG-15bis (Soviet Union, 1948)
Chance Vought F4U-1 Corsair (United States, 1943)
Messerschmitt Bf 109F (Germany, 1942)
Supermarine Spitfire IIA (Great Britain, 1936)
AIR FRANCE
F-BHSV
Boeing 707 321B (United States, 1961)
LZ 129 Hindenburg (Germany, 1936)
G-BOAD
British airways
Aerospatiale/BAC Concorde (France/Great Britain, 1976)

These 20 aircraft, all painted to scale by internationally known aviation artist John Amendola, highlight two centuries of man's conquest of the skies. Each aircraft is dated with the year it entered service or, for unique models, the year of its initial flight.

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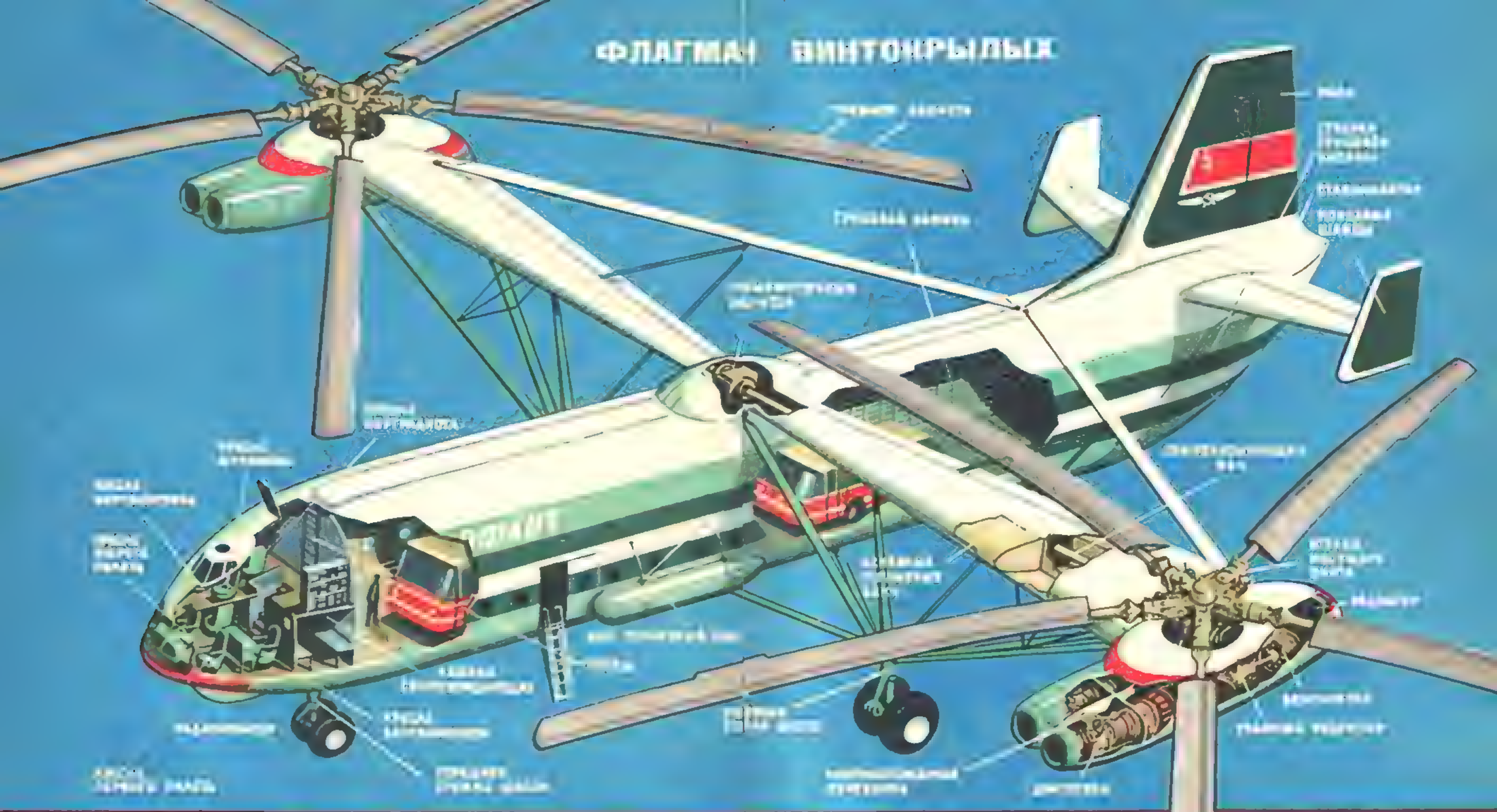
ФЛАГМАН ВИНТОКРЫЛЫХ



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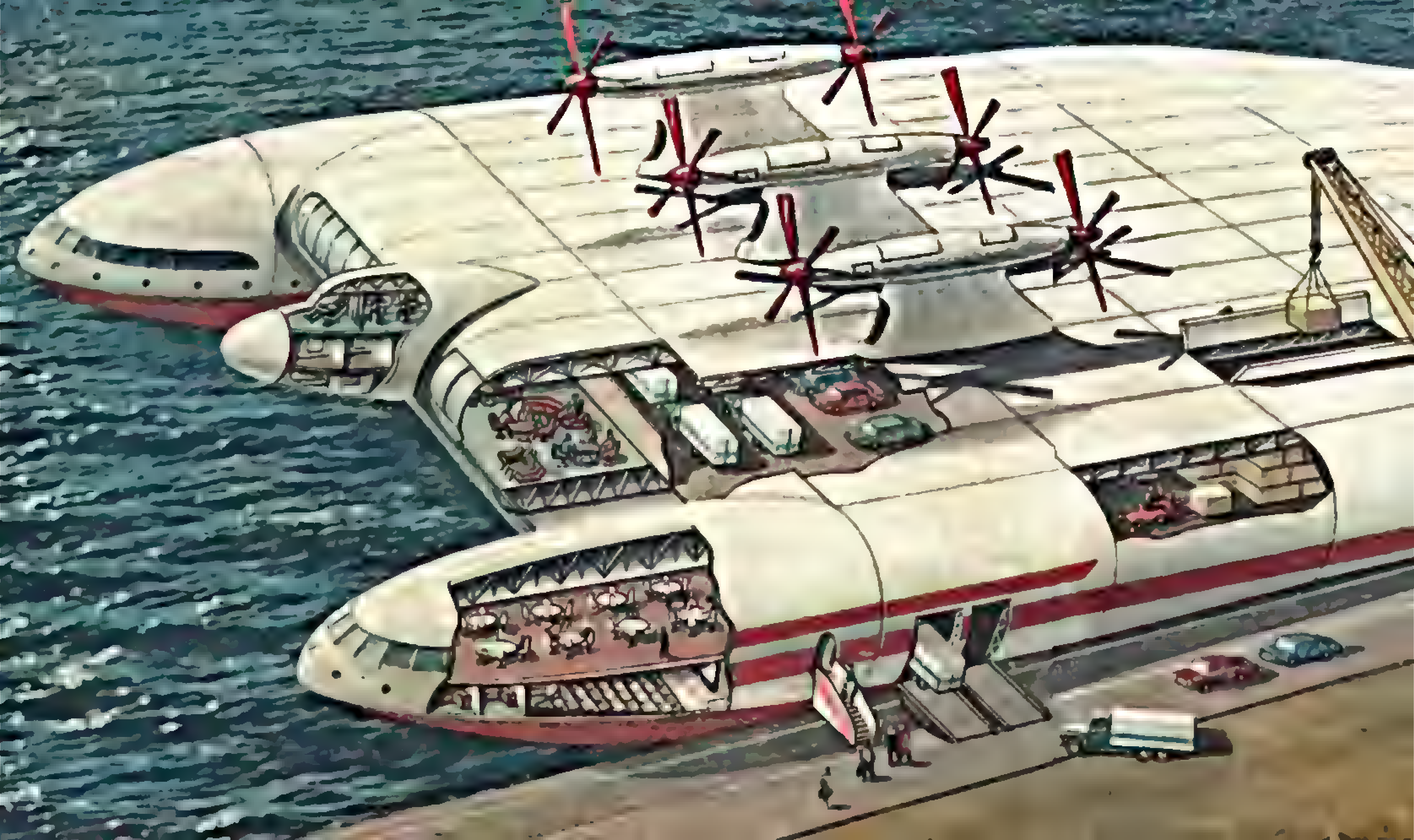
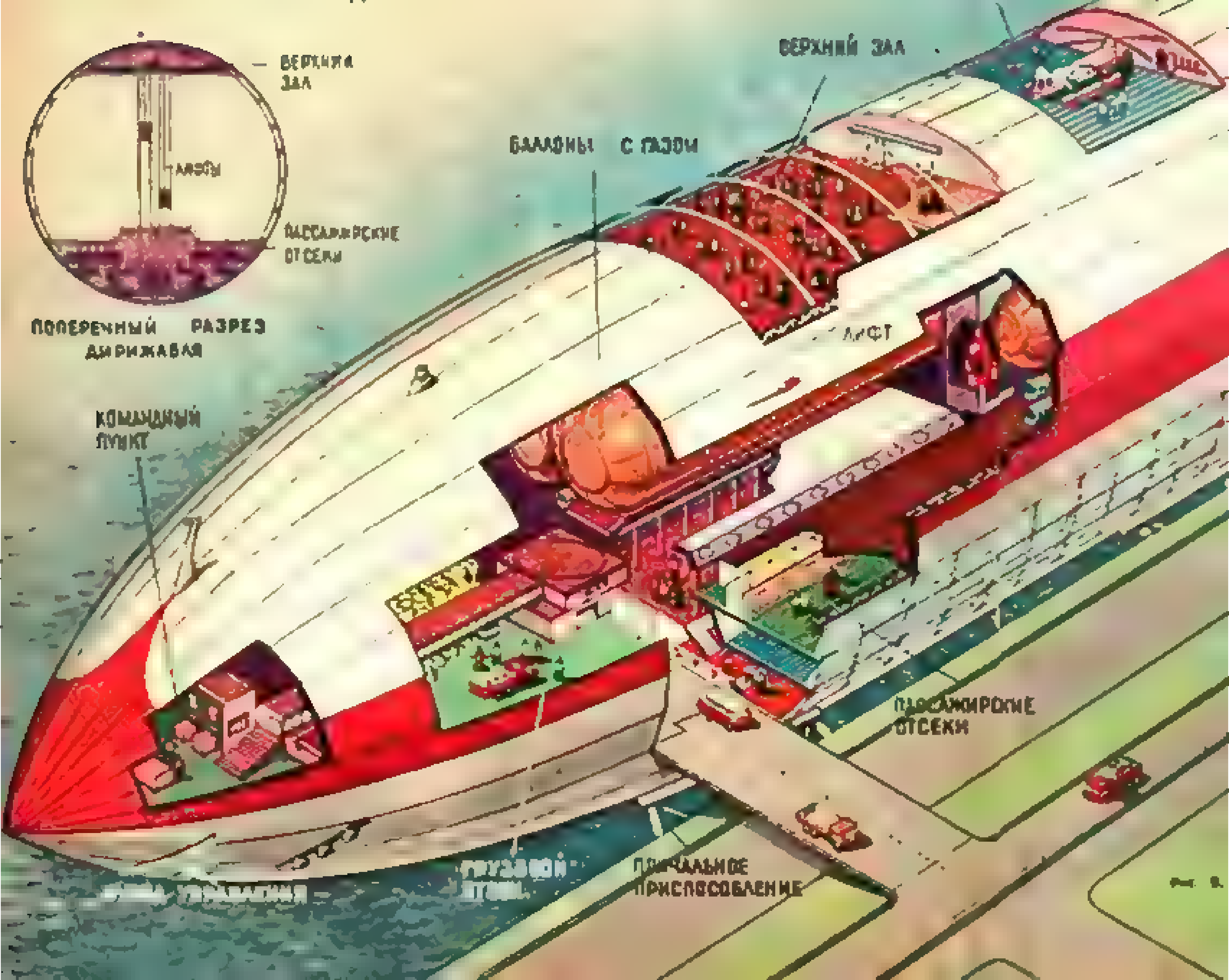



ВЕРХНИЙ ЗАЛ
ЛИФТЫ
ПАССАЖИРСКИЕ ОТСЕКИ
ПОПЕРЕЧНЫЙ РАЗРЕЗ ДИРИЖАБЛЯ
ВЕРХНИЙ ЗАЛ
БАЛЛОНЫ С ГАЗОМ
ЛИФТ
КОМАНДНЫЙ ПУНКТ
ПАССАЖИРСКИЕ ОТСЕКИ
РУБКА УПРАВЛЕНИЯ
ГРУЗОВОЙ ТРЮМ
ПРИЧАЛЬНОЕ ПРИСПОСОБЛЕНИЕ

Фиг. 9.

Cross a gangplank to Caribbean Adventure

Relax luxuriously in your deck chair. Watch gulls wheeling lazily in the sky, as your ship ploughs a foaming furrow southward. Soon you're in the blue Caribbean—rich in the turbulent history of the Carib Indians, Spanish Conquistadors and bloody buccaneers. Then comes a parade of ports . . . Kingston, Curacao, La Guaira, Puerto Cabello, Guanta, Port of Spain and Ciudad Trujillo. And you discover how distinctively different each one is. There's so much to see and do when you cruise the Caribbean on an air conditioned Alcoa ship out of New Orleans. Write today for booklet. Alcoa Steamship Company, Inc.,
Dept. B, 17 Battery Place, New York 4, N. Y. or
Dept. B, One Canal Street, New Orleans 16, La.

ALCOA
sails the CARIBBEAN

THE CARIB INDIANS . . . were for years fierce defenders of their islands against an engulfing flood of Spanish, English, French and others. Today, only a dwindling handful of pure Caribs remain to grace this colorful, tropical region that so proudly bears their name.

ALCOA STEAMSHIP COMPANY, INC. OFFICES IN: BALTIMORE, CHICAGO, MOBILE, MONTREAL, NEW ORLEANS, NEW YORK, NORFOLK, ST. LOUIS, TORONTO

Artist — Ben Cunningham, native of Nevada

NEVADA — *annual purchases: $170 million — mostly packaged.*

CONTAINER CORPORATION OF AMERICA

Artist – Joseph Gering native of West Virginia

WEST VIRGINIA *annual purchases: $1 billion mostly packaged.*

CONTAINER CORPORATION OF AMERICA

ARTZYBASHEFF

"—mountains are leveled and oceans bounded by the slender force of human beings"—SAMUEL JOHNSON

Why communications get better all the time

YOUR VOICE girdles the globe in one-seventh of a second.

It travels at 186,000 miles per second—the speed of light—thanks to the telephone and radio. And by television, so do the pictures of any event as it occurs.

What has made this blinding speed possible? What has given us these "ringside seats" . . . to see, to hear, to share in the headline news of the day?

The answer: Greater knowledge of electronic waves and better materials to harness them. For example, the vacuum tube—heart of radio or television—depends upon the greatest possible absence of air or other gases—a high vacuum. Most of the air is pumped out before the tube is sealed. Then a tiny bit of barium, called a "*barium getter*" is flashed inside of it by electricity. This captures the remaining air and gives a nearly perfect vacuum.

Unending research and engineering have also provided finer plastics for insulation, purer graphite and carbon for electronic devices . . . and a host of other basic materials that help shave the speed of communications to the tiniest splinter of a second.

Producing these better materials and many others—for the use of science and industry and the benefit of mankind—is the work of the people of UNION CARBIDE.

FREE: *You are invited to send for the illustrated booklet, "Products and Processes," which describes the ways in which industry uses UCC's Alloys, Carbons, Chemicals, Gases and Plastics.*

UNION CARBIDE
AND CARBON CORPORATION
30 EAST 42ND STREET · NEW YORK 17, N. Y.

Products of Divisions and Units include

LINDE OXYGEN • PREST-O-LITE ACETYLENE • PYROFAX GAS • BAKELITE, KRENE, VINYON, AND VINYLITE PLASTICS
KEMET GETTERS • NATIONAL CARBONS • EVEREADY FLASHLIGHTS AND BATTERIES • ACHESON ELECTRODES
PRESTONE AND TREK ANTI-FREEZES • ELECTROMET ALLOYS AND METALS • HAYNES STELLITE ALLOYS • SYNTHETIC ORGANIC CHEMICALS

"—*The real essence of work is concentrated energy*"—WALTER BAGEHOT

Why construction gets better all the time

WHERE ROADS were once built a shovelful at a time . . . today mammoth earth-movers handle a ton of earth at a time. Mobile cranes swing 20 tons at the flick of a switch. Giant crushers grind 150 tons of rock an hour. Traveling concrete mixers place entire batches as they go.

These are just a few of our improved powered tools of today that do a better job of construction *faster* and *easier*. They help provide us with critically needed new housing and business buildings . . . with super-highways and airfields for safer, smoother travel. And these tools are ours today because of research . . . and *better materials*.

Alloy steels, for example, give them greater strength to resist shock and abrasive action . . . stamina to overcome the strain of day-by-day speed-up demands. And modern oxy-acetylene processes for welding and flame-cutting speed production of these better products of better steel.

Carbon is in the picture, too. In the form of electrodes, it's essential both to the production of alloy steels and the making of calcium carbide . . . from which comes acetylene gas for welding. Also, a chemical known as an *amine* provides a wetting agent for asphalt . . . speeding construction by making the asphalt stick more easily and firmly to its crushed rock base.

The people of Union Carbide produce these and many other materials essential to today's better building and construction. They also produce hundreds of other materials for the use of science and industry, to help meet the needs of mankind.

FREE: *You are invited to send for the new illustrated booklet, "Products and Processes," which describes the ways in which industry uses UCC's Alloys, Chemicals, Carbons, Gases, and Plastics.*

UNION CARBIDE
AND CARBON CORPORATION
30 EAST 42ND STREET UCC NEW YORK 17, N. Y.

Trade-marked Products of Divisions and Units include

ELECTROMET Alloys and Metals • HAYNES STELLITE Alloys • PREST-O-LITE Acetylene • LINDE Oxygen
BAKELITE, KRENE, VINYON, and VINYLITE Plastics • SYNTHETIC ORGANIC CHEMICALS • PYROFAX Gas
ACHESON Electrodes • NATIONAL Carbons • PRESTONE and TREK Anti-Freezes • EVEREADY Flashlights and Batteries

make way for better roads . . . around the world!

Tomorrow's roads are today's detours—filled with bulldozers and power shovels, earth-moving equipment and tremendous trucks. Many of these diverse machines have one thing in common: they count on American Brake Shoe for many of the parts needed to keep them hard at work.

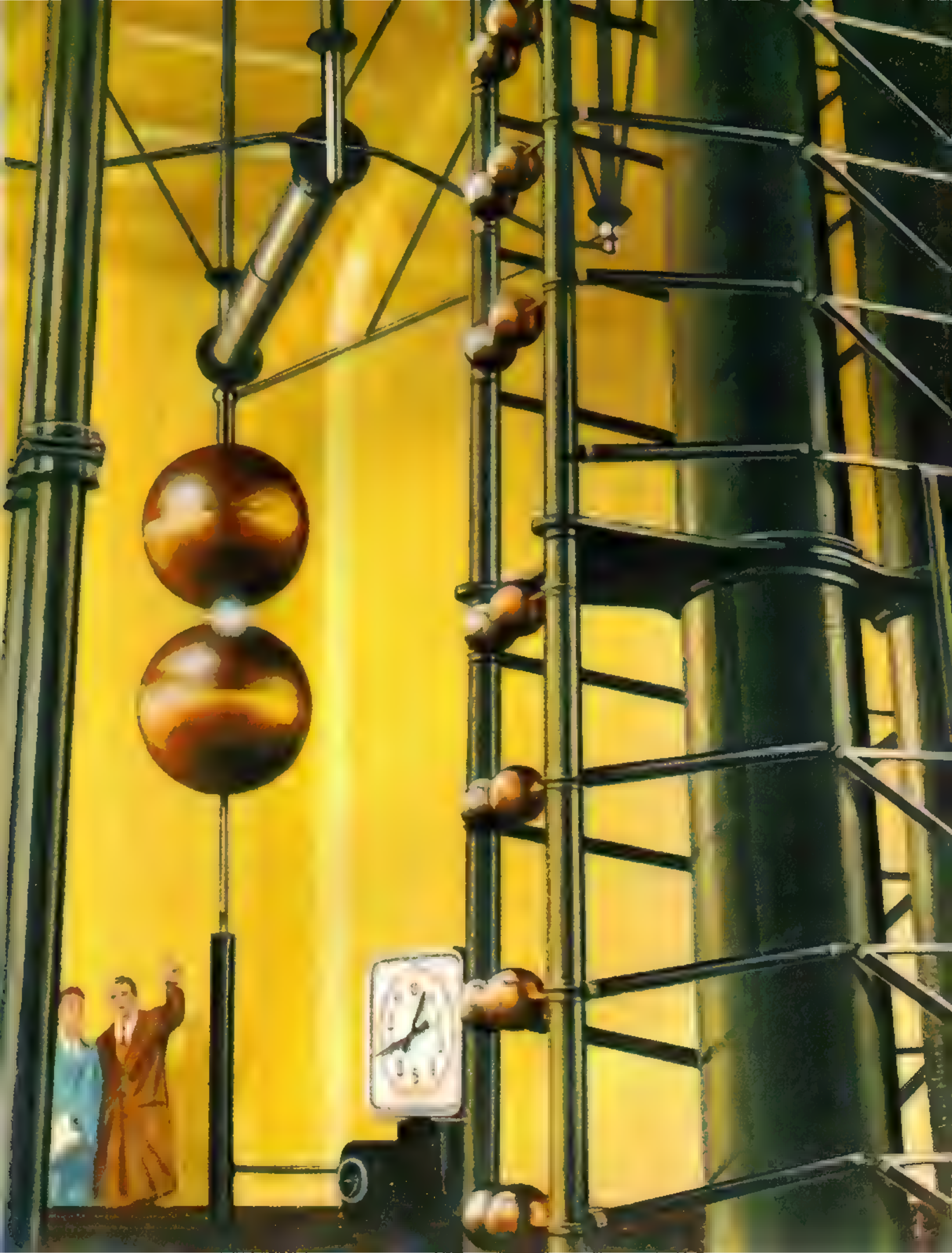
Trucks rely on our American Brakeblok brake linings . . . power shovels dig with our tough manganese steel dippers. Steering clutches depend on our sintered metallic friction discs . . . tractors and dozers power their accessories with our hydraulic pumps. And in much of this equipment you'll find our sturdy castings and forgings. These rugged components help contractors meet tight schedules because they have built-in resistance to wearing out!

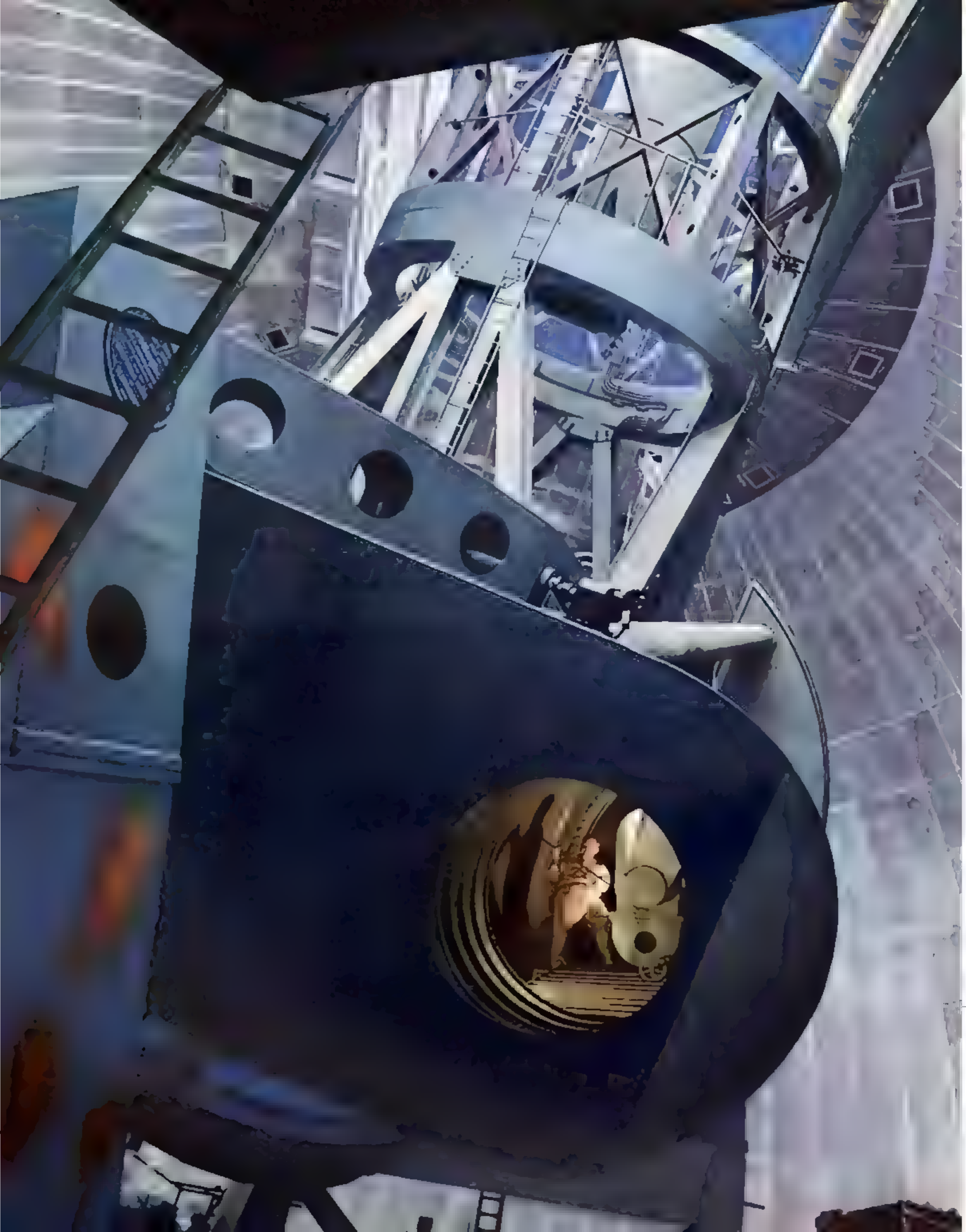
Brake Shoe's experience is greatest where the going is hardest, where mechanical parts *must* stand up under the worst of wear . . . in many kinds of machinery and equipment. How about yours? American Brake Shoe Company, 530 Fifth Ave., New York 36, N. Y.

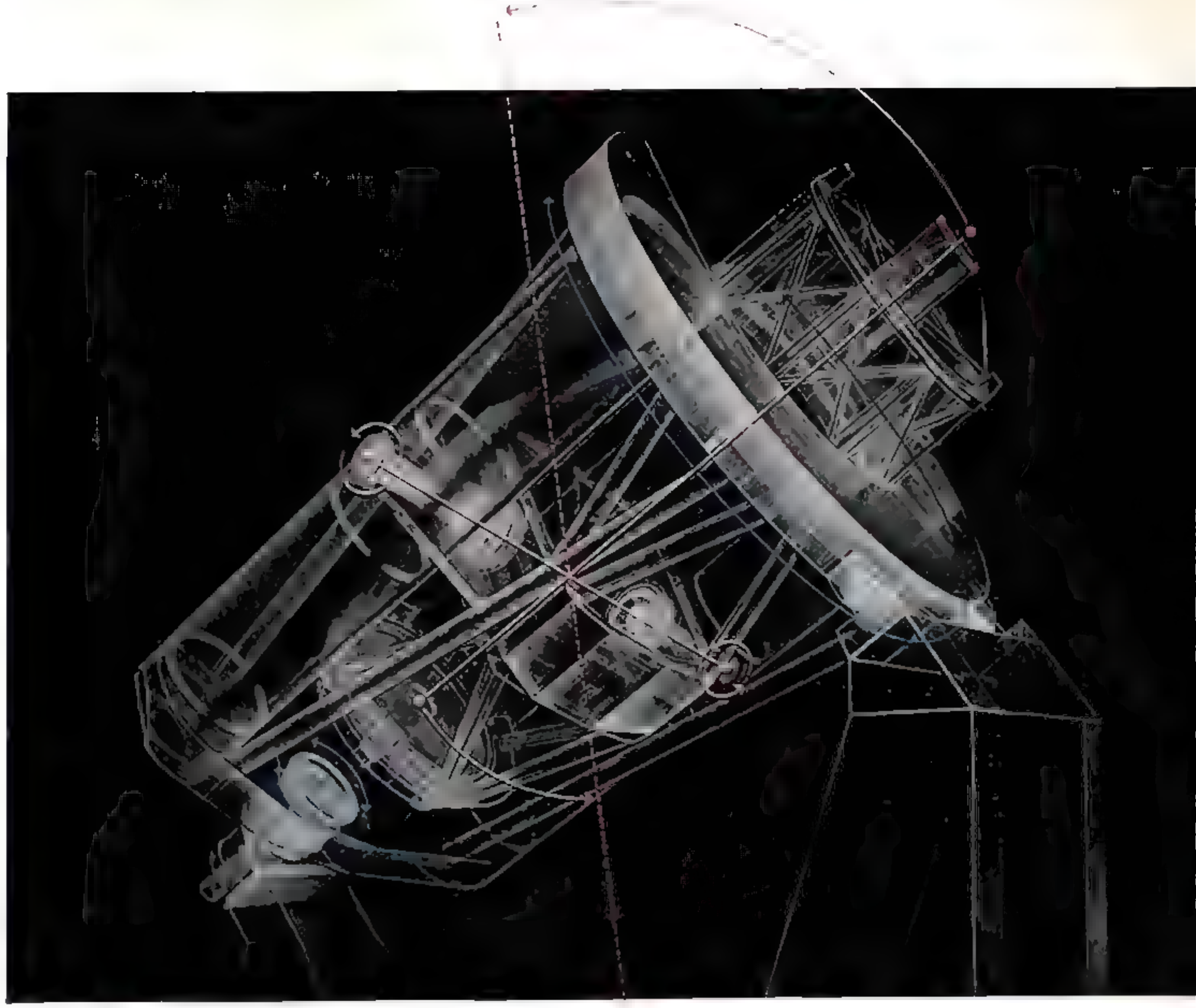
vital parts for the worlds of industry: AMERICAN BRAKEBLOK DIVISION • AMFORGE DIVISION • AMERICAN MANGANESE STEEL DIVISION • DENISON ENGINEERING DIVISION • ELECTRO-ALLOYS DIVISION • ENGINEERED CASTINGS DIVISION • KELLOGG DIVISION NATIONAL BEARING DIVISION • RAILROAD PRODUCTS DIVISION • IN CANADA: DOMINION BRAKE SHOE COMPANY

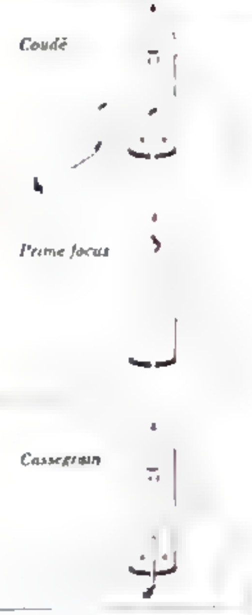
AMERICAN
Brake Shoe
COMPANY

exploring the universe
the energetic sea
ERIK NITSCHE
GENERAL DYNAMICS



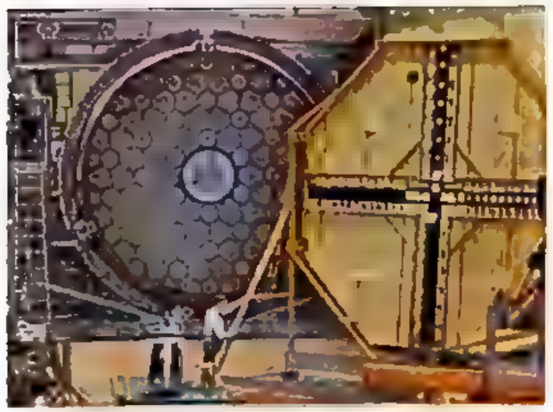






The giant telescope of Palomar

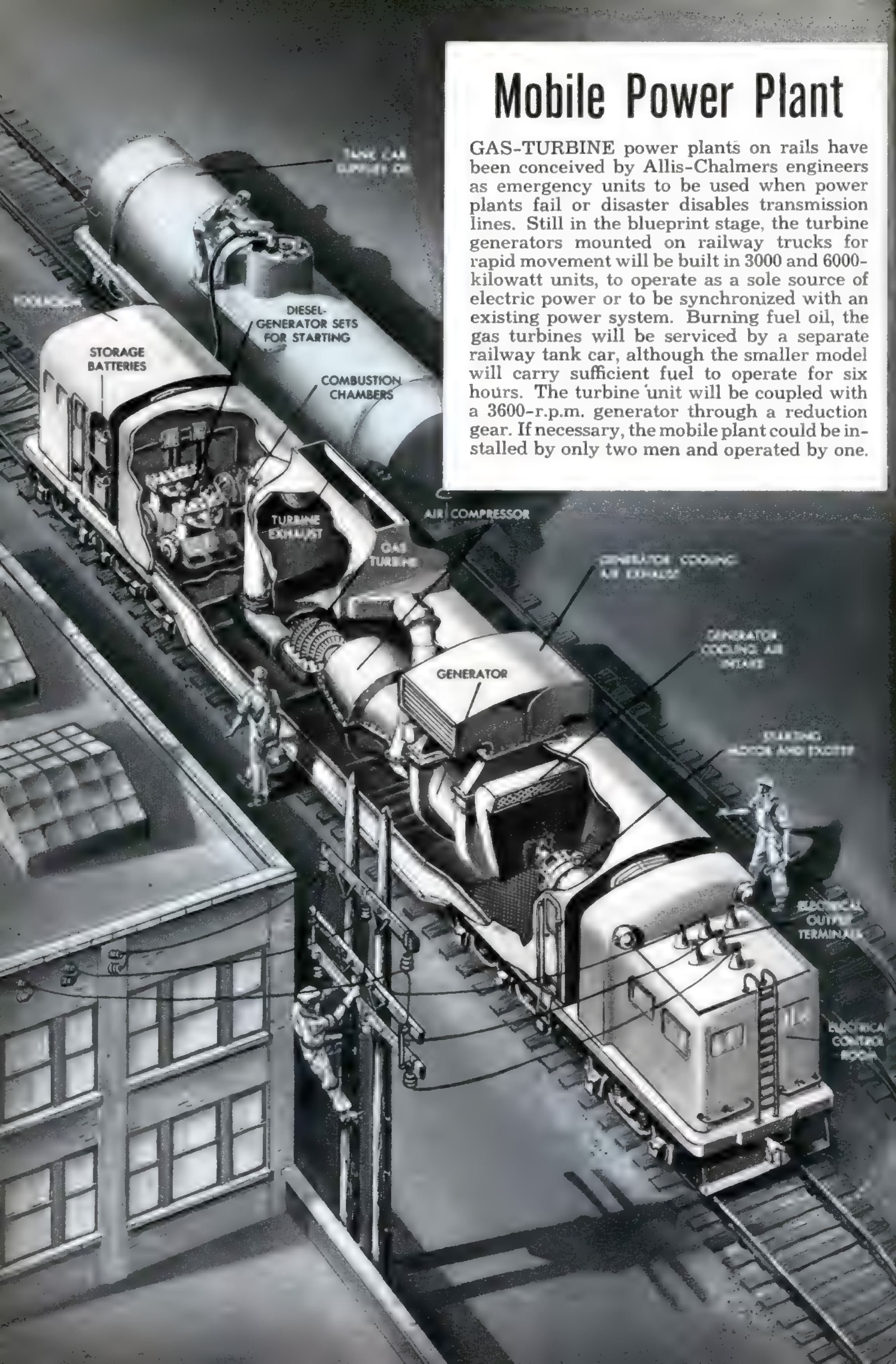
Begun in 1928 on $6 million from the Rockefeller General Education Board, the world's greatest telescope suffered suspension of construction during four war years. It now nears completion on Palomar Mountain, California. With its 125-ton bulk delicately poised in a 375-ton cradle, the new 200-inch reflector is one of the great engineering feats of modern times. Its monumental size speaks from the opposite page. When it swings upon the stars this year, it should increase the volume of the visible universe eight times. Contrary to popular ideas, it will be useful not in making near objects bigger, but only in making distant stars brighter. It is expected to determine whether the red shift observed in the spectrum of the outer galaxies represents true velocity. It may also bring in data on the curvature of the universe and the average density of matter, from which physicists could calculate whether the universe is finite or infinite—and if finite, its exact dimensions.

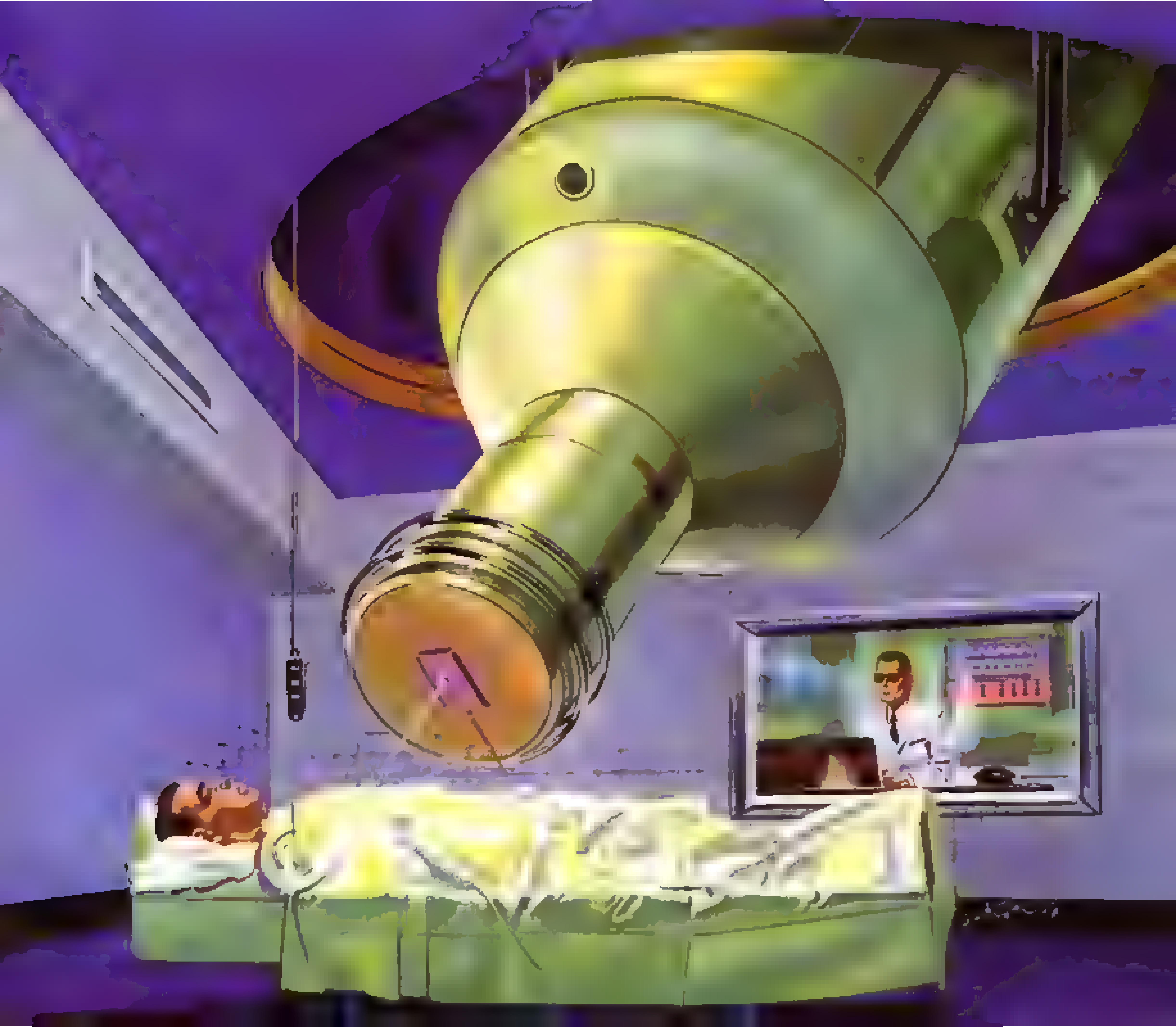


The 200-inch mirror Polishing its huge surface has been the last, slowest, most delicate job, under Dr. John A. Anderson (above). It is being brought to one-millionth inch of true parabola, a tolerance that is measurable only against the wave length of light.

Mobile Power Plant

GAS-TURBINE power plants on rails have been conceived by Allis-Chalmers engineers as emergency units to be used when power plants fail or disaster disables transmission lines. Still in the blueprint stage, the turbine generators mounted on railway trucks for rapid movement will be built in 3000 and 6000-kilowatt units, to operate as a sole source of electric power or to be synchronized with an existing power system. Burning fuel oil, the gas turbines will be serviced by a separate railway tank car, although the smaller model will carry sufficient fuel to operate for six hours. The turbine unit will be coupled with a 3600-r.p.m. generator through a reduction gear. If necessary, the mobile plant could be installed by only two men and operated by one.


TANK CAR SUPPLIES OIL
TOOLROOM
DIESEL-GENERATOR SETS FOR STARTING
STORAGE BATTERIES
COMBUSTION CHAMBERS
TURBINE EXHAUST
GAS TURBINE
AIR COMPRESSOR
GENERATOR COOLING AIR EXHAUST
GENERATOR COOLING AIR INTAKE
GENERATOR
STARTING MOTOR AND EXCITER
ELECTRICAL OUTPUT TERMINALS
ELECTRICAL CONTROL ROOM



How to Run An Atomic Power Plant

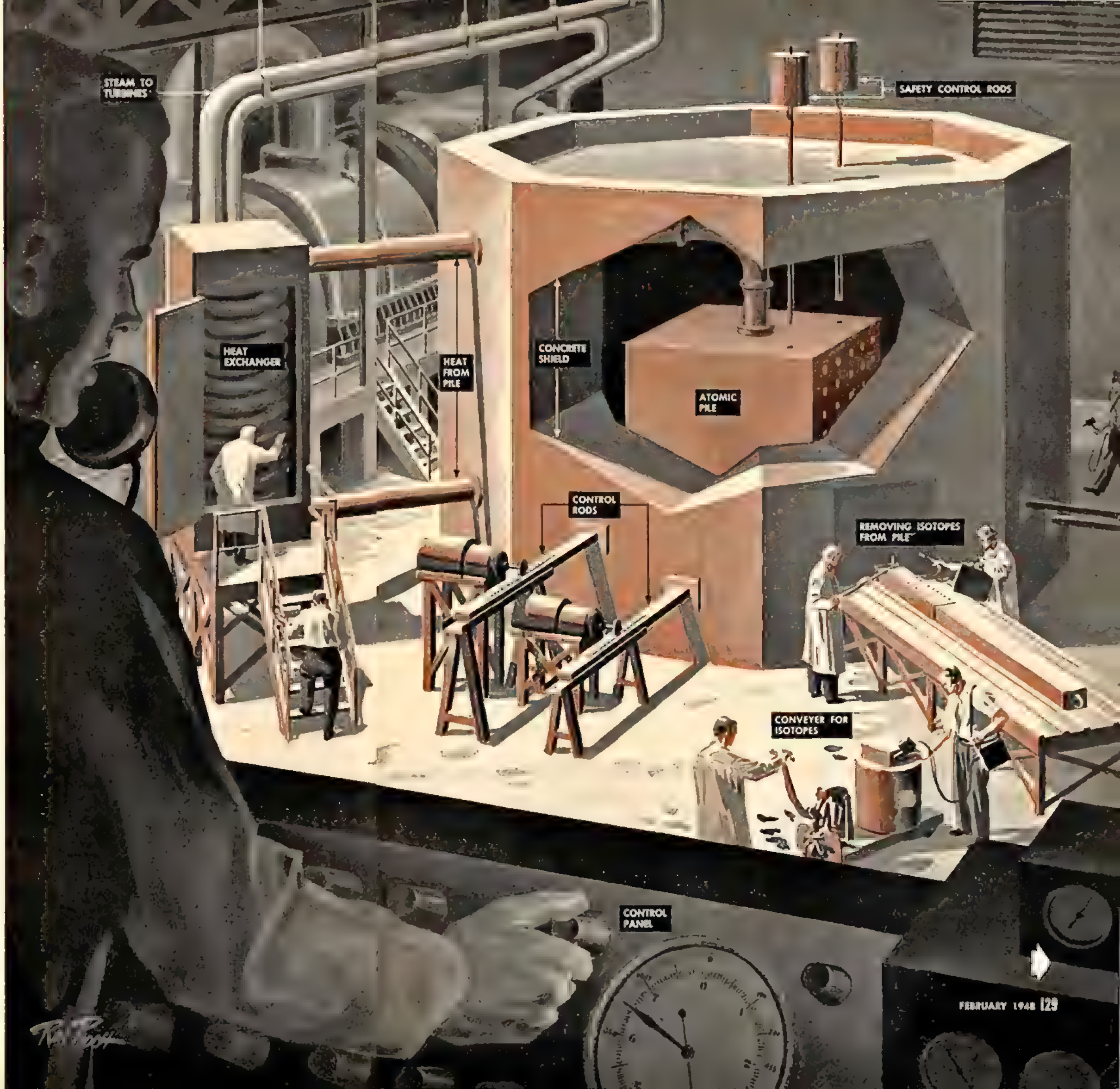
Nuclear research piles give preview of methods that may be used to make tomorrow's electricity.

By Martin Mann

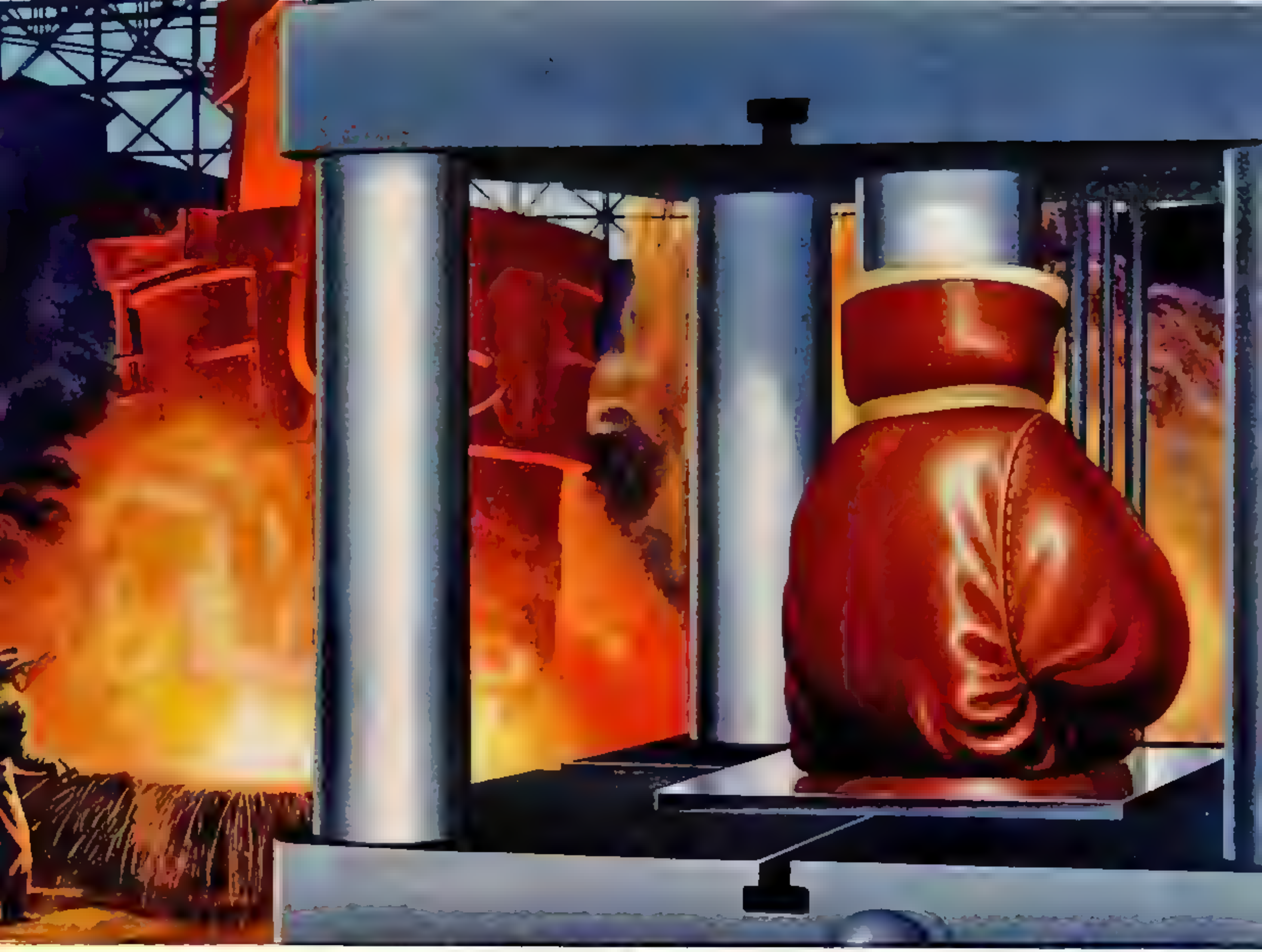
You—as a citizen—own a part of the 2½-billion-dollar atomic-energy industry. Although your individual share is only one in 143,000,000, it is probably the most important single thing you own. It provides the most powerful weapon in our arsenal for war, promises cures for many diseases, and will eventually furnish cheaper electricity and transportation.

YOU'VE heard a lot about atomic energy. But you probably have a lot of questions because so few people have actually seen an atomic engine. Well, I have. I was one of a small group of reporters who saw two nuclear piles early this winter. While they were operating, I touched them, stood on top of one, saw it turned on and off, watched as "hot" radioactive materials were taken out of it. So maybe I can help you visualize the process and get rid of some of the mystery.

Let's imagine you have just gotten a job running an "atom furnace." Sure I mean you! Some day such jobs will be as common as locomotive engineers. The engines of the future will be like the experimental piles I saw at the Argonne National Laboratory, which the University of Chicago runs for the U. S. Atomic Energy Commission.



Atomic power plant of future may look like this drawing. Some shielding omitted to show details.



THOMPSON PRODUCTS, INC., big name in valves and jet propulsion components, helps the automotive and aviation industries produce powerful engines. A Shell Industrial Lubricant developed for Thompson solved a tough production problem.

400 TON WALLOP

Sponsor of the Thompson Trophy, world's most famous air award for speed over a closed course, Thompson Products, Inc. is known even better to industry as the producer of Thompson Valves. And that's a job! . . .

Big forging presses deliver their heavyweight wallop to valve billets heated to 2000 F., shaping valves from the tough alloy steel. *And* those tough alloys smack back just as hard at the dies used to shape them . . .

Using the finest available die materials, die life in this operation was still too short. Thompson called Shell's Lubrication Engineers into consultation.

Working with Thompson's engineers, Shell's experts solved the problem. The answer, a special Die Compound, was developed specifically to meet the needs of Thompson's secret and exclusive forging method.

Today, this Shell Industrial Lubricant is hard at work in Thompson's valve-forging operation. *Die life now is extremely long* . . . and performance highly satisfactory.

Yesterday's answer to a lubrication problem is seldom good enough for today. Shell's *complete* and *progressive* lubrication plan includes: study and analysis of plant and machines; engineering counsel; advice on applying lubricants, schedules and controls for each machine; periodic reports on progress. *Are you sure the machines in your plant benefit by all that's new in lubrication? Call in the Shell Lubrication Engineer.*

Leaders In Industry Rely On
SHELL INDUSTRIAL LUBRICANTS

SHELL

This symbolic drawing by A. Leydenfrost, the noted illustrator, traces the progress during *Popular Mechanics'* half century in the fields of mechanics and science. See explanatory chart of the drawing on page 125

To do these things, every resource of science and technology was drawn upon and further developed. The results were so strikingly important that, for the first time in our history, the public became convinced that science was a resource worth exploiting for the national welfare as well as for the intellectual joy of discovery. The result was a significant increase in the prestige of science, and its financial support by government, industry and educational institutions. By and large, it can be stated that the great development of American chemical industry dates from the World War I period.

This type of stimulation of systematic group attack on technological problems was even more pronounced during World War II, with complete mobilization of the nation's scientific resources under the Office of Scientific Research and Development and the military departments. Guided missiles, radar, bombsights and fire-control instruments, penicillin and hundreds

--- CLOSER THAN WE THINK!

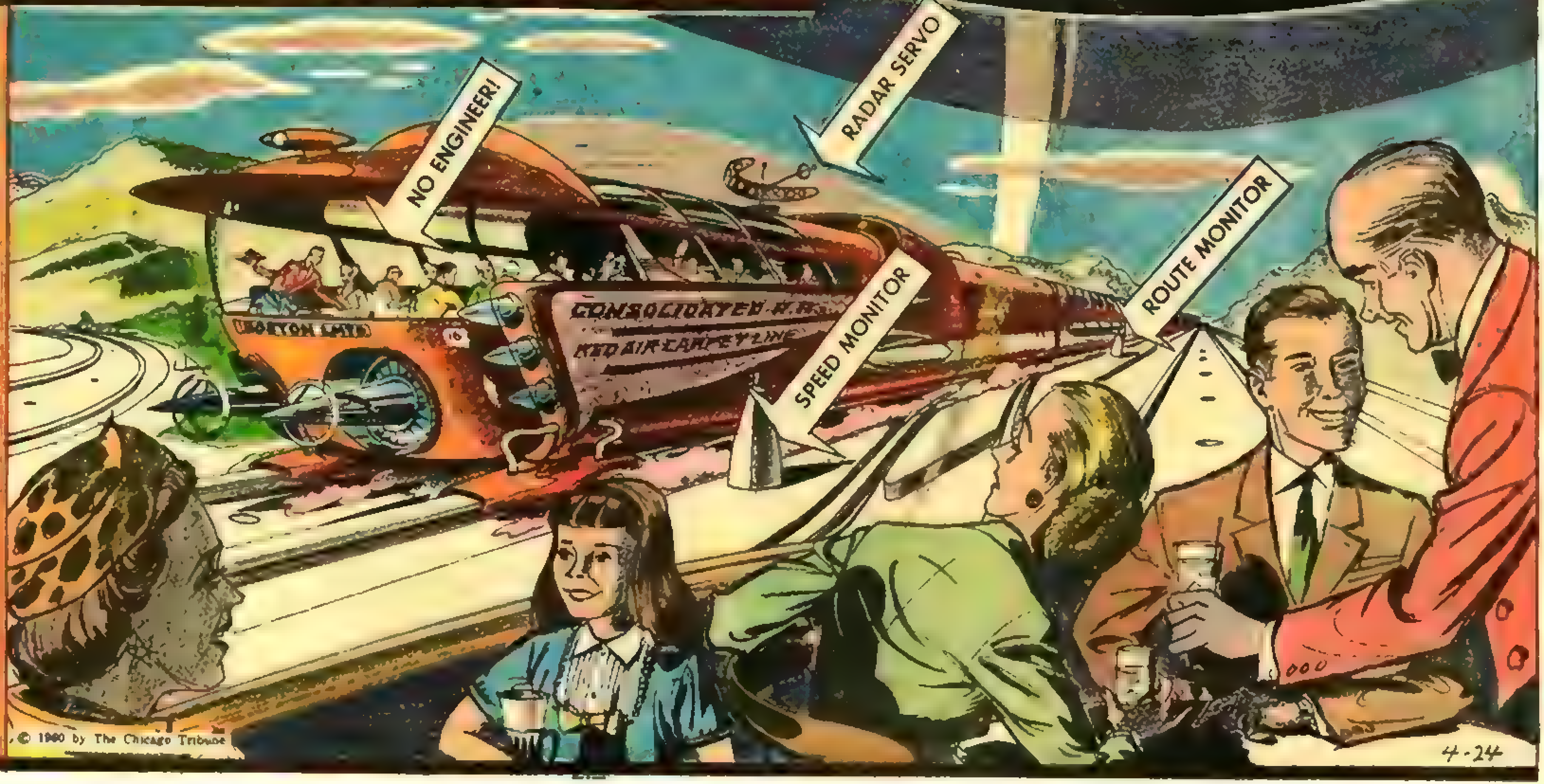
by Radebaugh

ROBOT RAILROADING

Future trains will be fully automatic—robots that can regulate their own speed and control their own movements to meet the most precise schedules.

The Union Switch and Signal Division is currently working on two kinds of electronic "brains" to make this possible. One type would be a trackside "decision maker," to regulate train speed, routing, starting and stopping. The other would be a "control servo," to signal that the robot train is obeying orders—or isn't, and why. A central monitoring panel would oversee train movements for hundreds of square miles. The first such installation may be on the New York subway shuttle trains.

Next week: Lunar Power Pack



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4-24

--- CLOSER THAN WE THINK!

by Radebaugh

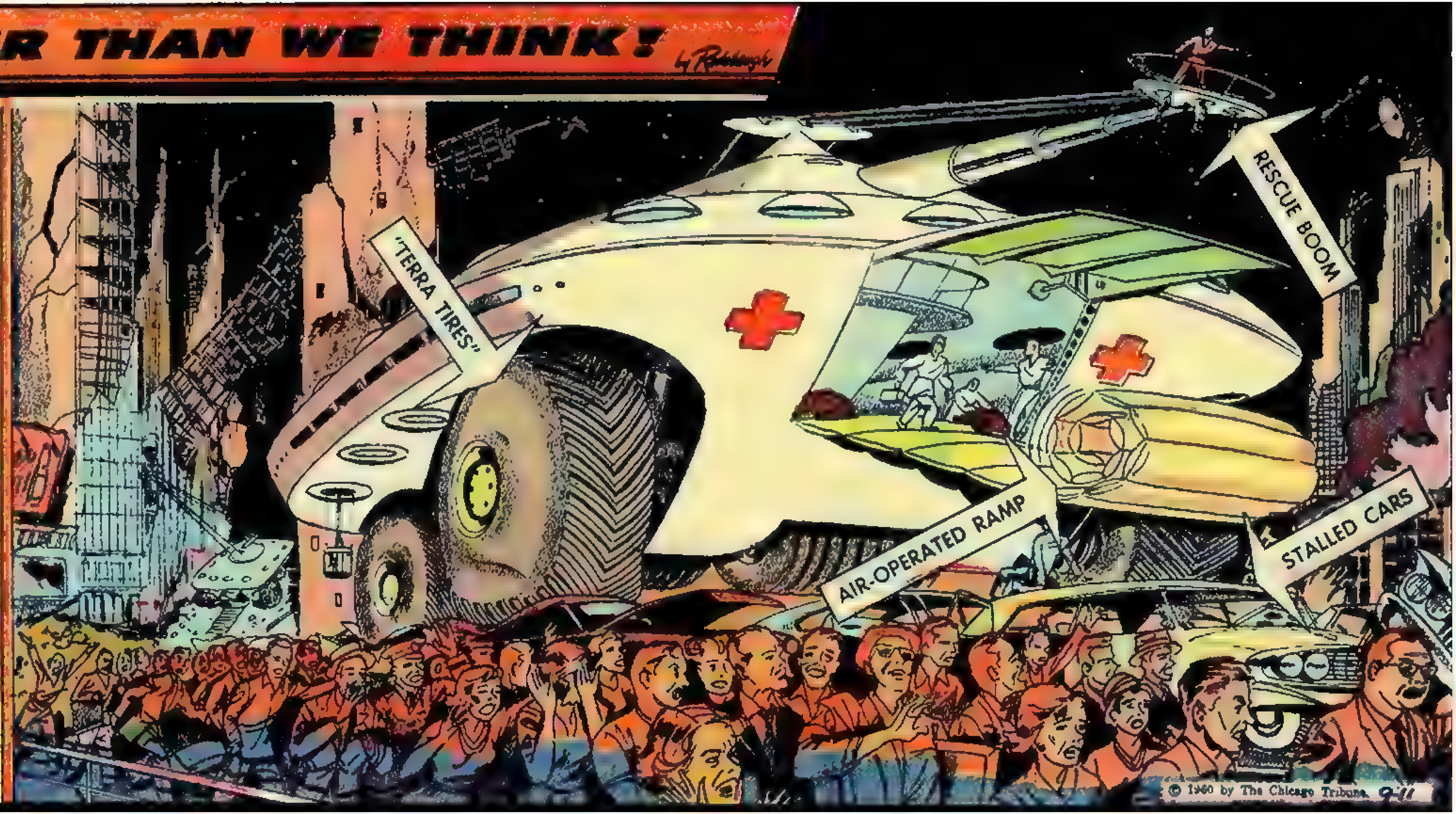
DISASTER VEHICLE

Tomorrow's methods of coping with catastrophes will make our present-day equipment as obsolete as the horse-drawn drays that handled the San Francisco fire havoc in 1906.

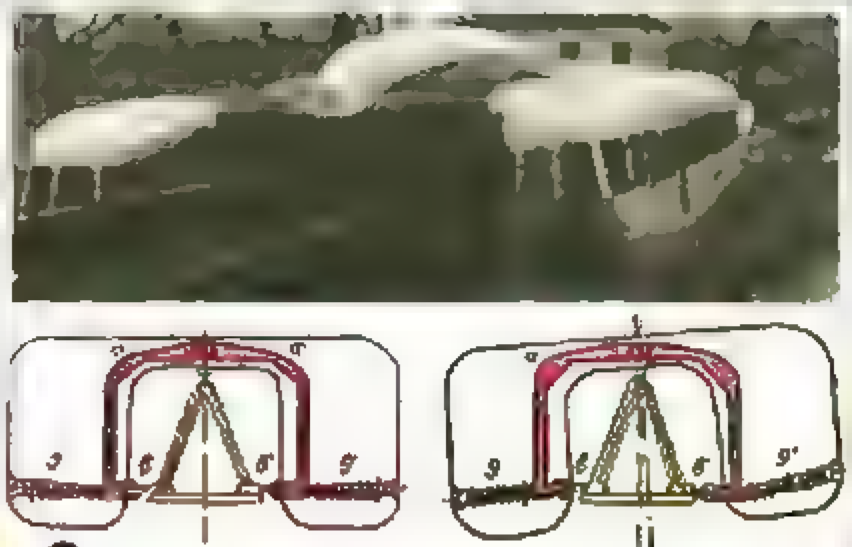
New king-size disaster wagons will face up to any kind of upheaval —atomic, atmospheric or volcanic. Their low-pressure "terra tire" doughnut wheels will permit movement across any kind of terrain, traffic or wreckage. Supplies will include hospital equipment, pharmaceuticals, blood, dehydrated food and the like.

Such wagons are now in the planning stage for military purposes. Compare also the enormous vehicles already in use as missile carriers, also those used in the mining and logging industries.

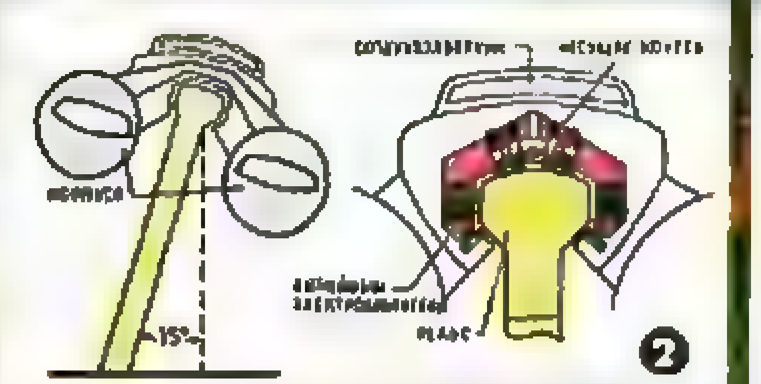
Next week: Sub Squelcher



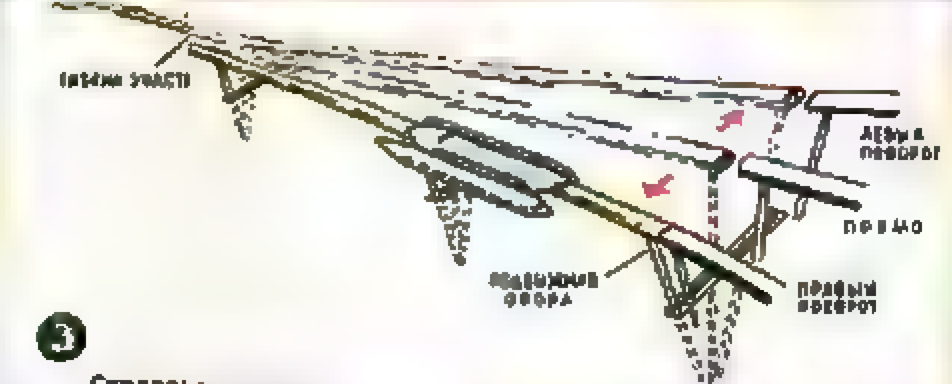
© 1960 by The Chicago Tribune. 9-11



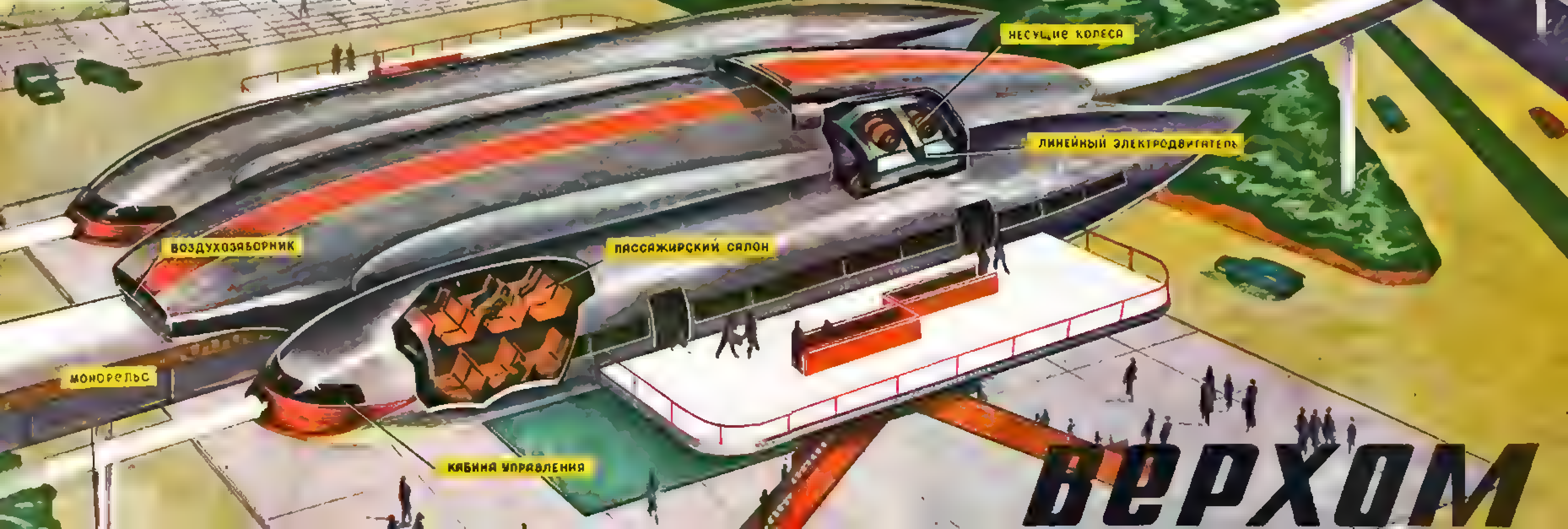
❶ Аэропоезд советского изобретателя С. Вальднера.



Монорельсовая система Трента



Стрелочный перевод.



ВЕРХОМ

SEE all

HEAR all

A picture that is clear and crisp and life-like . . . sound so natural you could swear you were actually there . . . and above all a built-in dependability of performance—a dependability which has made friends for G.E.C. all over the world and turned these initials into a household word everywhere. Your approved G.E.C. dealer will gladly demonstrate, for example, this fine 12" table set BT 5145, priced at 69 gns. tax paid.

SAY G.E.C. TELEVISION & RADIO

. . . you can depend on it!

THE GENERAL ELECTRIC CO.

Vought engineer...higher...faster...farther

Toward the preparation of man for the first steps into deep space, the Martin space medicine research program and space ecology laboratory facilities—now in development at the Denver Division—are among the most advanced activities in the free world. Especially noteworthy is the Martin Lunar Housing Simulator. This will be a self-sustaining environmental closed system which will permit advanced study of survival requirements and techniques applicable to airless lunar or planetary conditions.

THE FIRST STEP

Martin Denver
is one of the
eight divisions
of The Martin Company

MARTIN
BALTIMORE · DENVER · ORLANDO

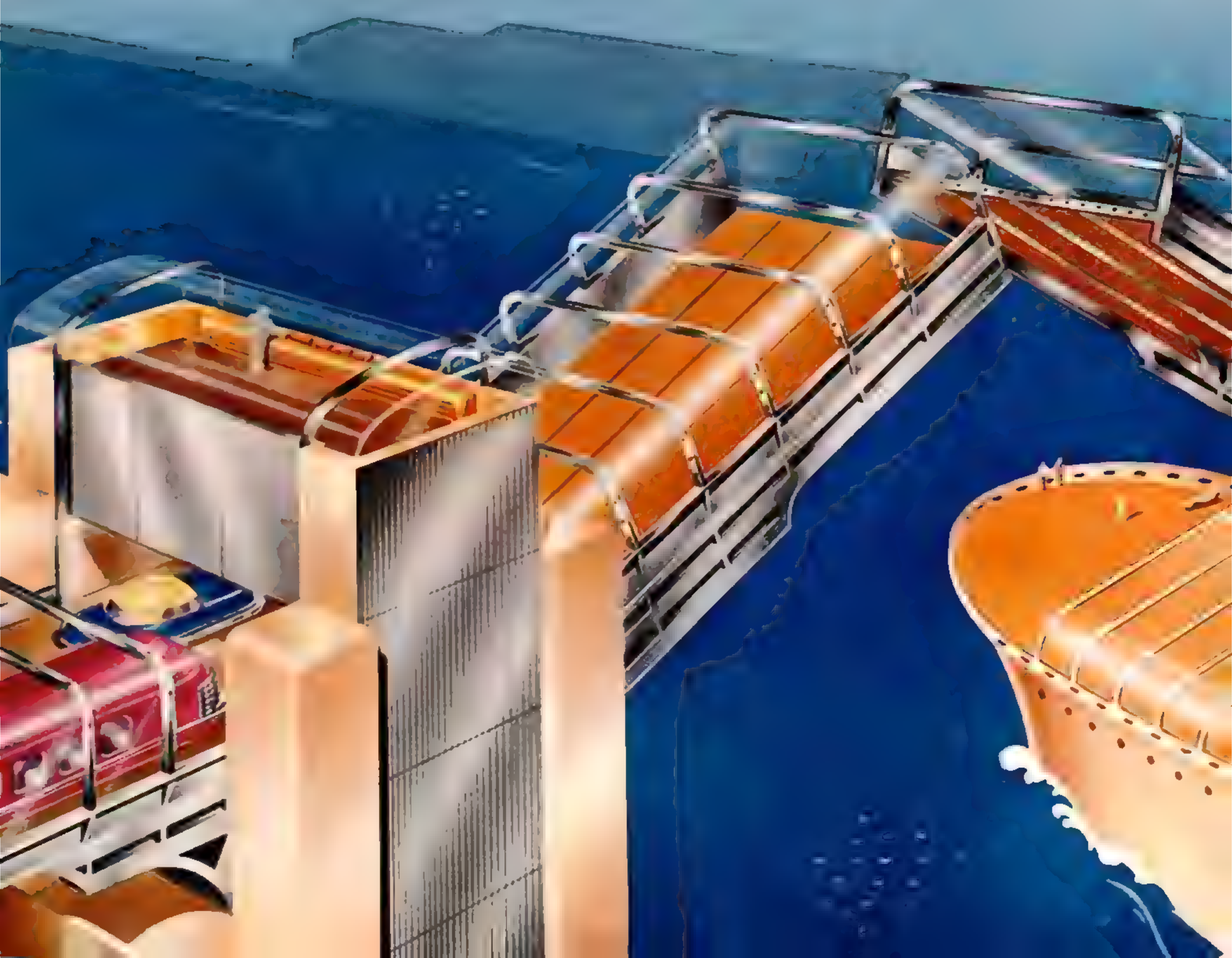
AN EYE OPENER FOR THE INDUSTRIAL WORLD

Covered bridges are reminiscent of days gone by. But here's one, made of aluminum and covered with plastic, that is a possibility for the world of the future. Bohn aluminum could readily figure in its construction, because aluminum combines those two sought-after qualities—strength with lightness. If this combination could be valuable in the products you make—our engineering staff would like to discuss with you the merits of aluminum or magnesium and possible applications.

BOHN

BOHN ALUMINUM AND BRASS CORPORATION • General Offices—Lafayette Building—Detroit 26, Michigan

Designers and Fabricators—**ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS**

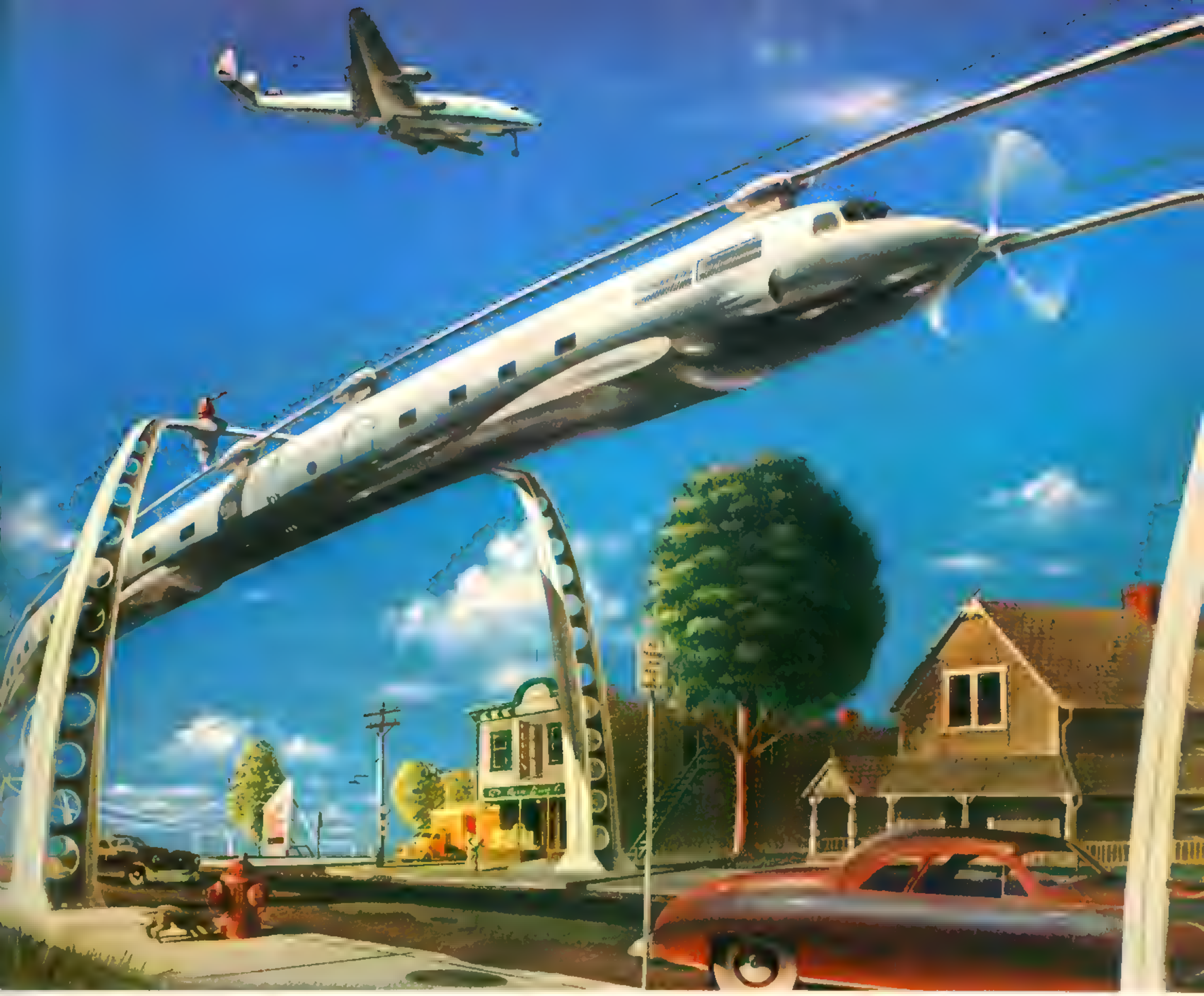


3 stories – 40,000 feet high!

BOHN

Here's an interior view of one of the three-decker stratosphere planes that one day may be making non-stop flights between Europe and America. This is only one of the amazing things the world of tomorrow holds in store for us. In many of these new products and in improvements of many products in daily use—the light alloys, magnesium and aluminum, will play an important part in effecting weight reductions, reducing operating costs. Bohn Engineers will be glad to consult with you in fitting these versatile light alloys into your production plans.

BOHN ALUMINUM AND BRASS CORPORATION
GENERAL OFFICES—LAFAYETTE BLDG. • DETROIT 26, MICHIGAN
Designers and Fabricators
ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS



From Airport To Town By Monorail

Getting to and from the airport often takes as long as the time spent in the air on short inter-city hops. Illustrated above is a plan to eliminate this time loss by fast monorail train. You will see new transportation developments—new products—in the days that lie just ahead. In many of these, aluminum and magnesium—fabricated by Bohn—will play an important part because of the great advantages these alloys possess, combining as they do, lightness with great strength, along with many other superiorities. Bohn engineers would like to discuss the merits of these light alloys with you as related to the products you make or intend to make.

BOHN

BOHN ALUMINUM AND BRASS CORPORATION
GENERAL OFFICES—LAFAYETTE BUILDING—DETROIT 26, MICHIGAN

Designers and Fabricators — **ALUMINUM** • **MAGNESIUM** • **BRASS** • **AIRCRAFT-TYPE BEARINGS**

More and more are advanced light alloys by Bohn being used in an ever-expanding variety of new products.

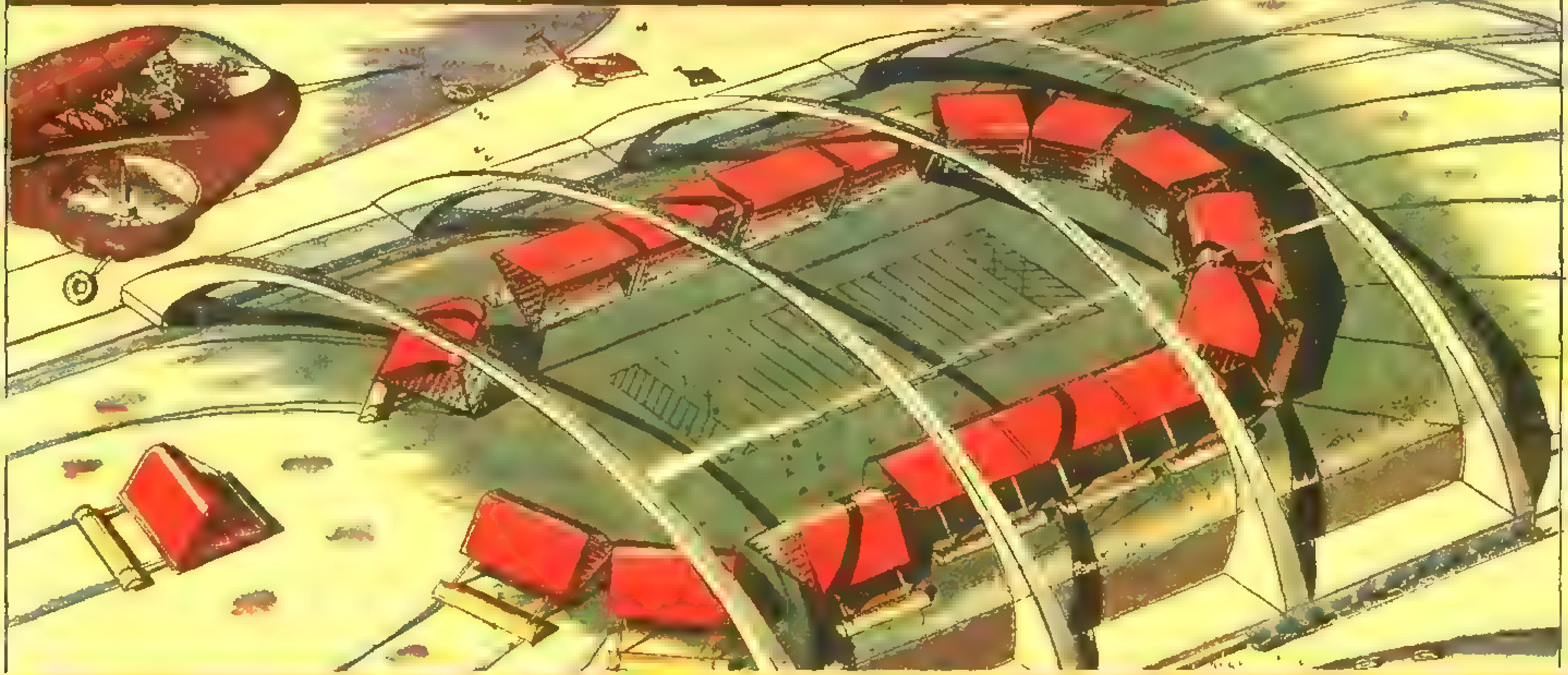
BOHN ALUMINUM & BRASS CORPORATION—GENERAL OFFICES, LAFAYETTE BUILDING, DETROIT 26, MICH.
Designers and Fabricators—ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

BOHN

A RADICAL DEPARTURE IN ROAD BUILDING EQUIPMENT

... CLOSER THAN WE THINK!

by Radebaugh



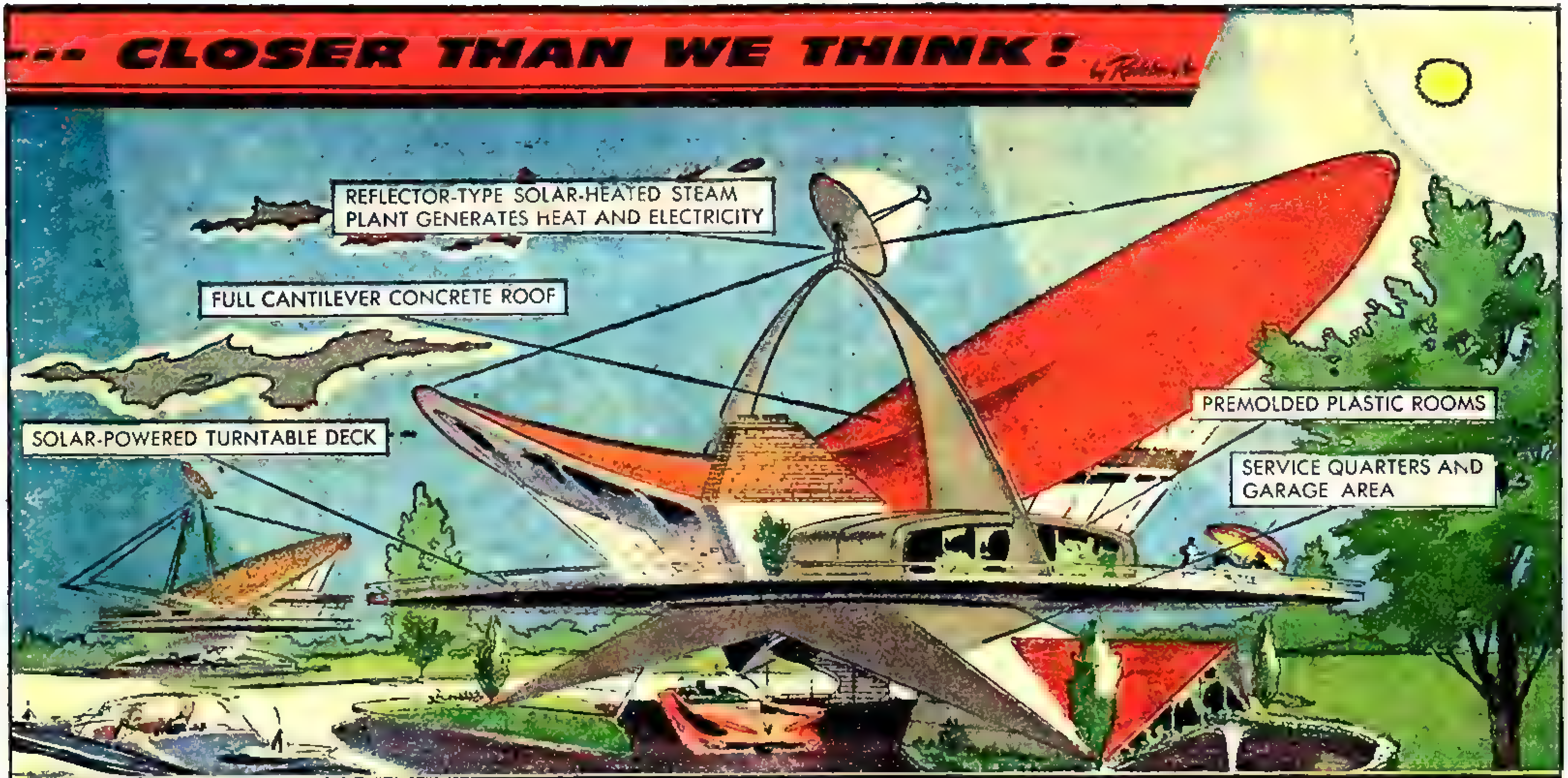
MECHANIZED STADIUM The stadium of tomorrow might very well be adaptable to a variety of athletic and other events, thereby solving a practical problem that has long plagued sports promoters

The mechanized arena depicted here contains self-propelled sectional grandstands made of a new lightweight high tensile aluminum. Such seating areas would be maneuverable and could be properly positioned for the event at hand with little difficulty. Thus the stadium would be as suitable for a baseball game as it would be for football, boxing or hockey.

And not only would such a stadium bring spectators right up to where the action took place—but as an added touch there might be an adjustable mobile glass roof to protect them from the elements.

Next week, "Turnpike Jet Lines"

... CLOSER THAN WE THINK!


REFLECTOR-TYPE SOLAR-HEATED STEAM PLANT GENERATES HEAT AND ELECTRICITY
FULL CANTILEVER CONCRETE ROOF
SOLAR-POWERED TURNTABLE DECK
PREMOLDED PLASTIC ROOMS
SERVICE QUARTERS AND GARAGE AREA

FOLLOW-THE-SUN HOUSE

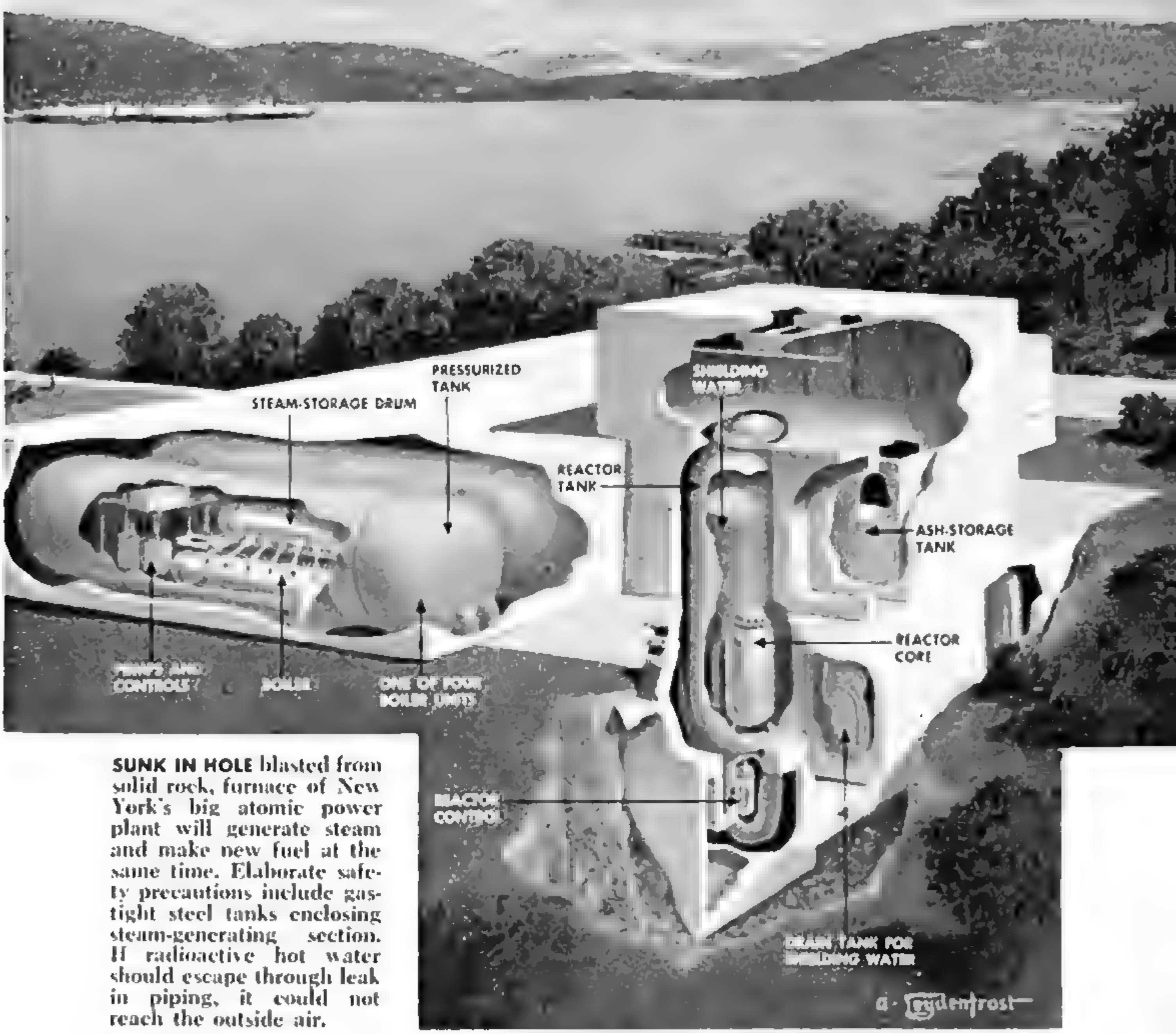
Don't be surprised if many of tomorrow's homes are built on turntables. They would slowly pivot all day long to receive maximum benefit from health-giving sun rays and insure heat in winter.

This warm and colorful year-round design is adapted from an aluminum firm's summer house which has been studied and admired by architects. It would be built, together with a patio, over a service and garage area.

Ground and living levels would connect through a glass-enclosed staircase. Two-way glass could bring the outside view to those on the inside, while protecting the latter from inquisitive passers-by. *Next week: Space Farmers*

to Serve New York

The country's biggest, it will burn a combination of uranium, thorium—and ordinary fuel oil—to make 250,000 kilowatts, enough for half a million homes.

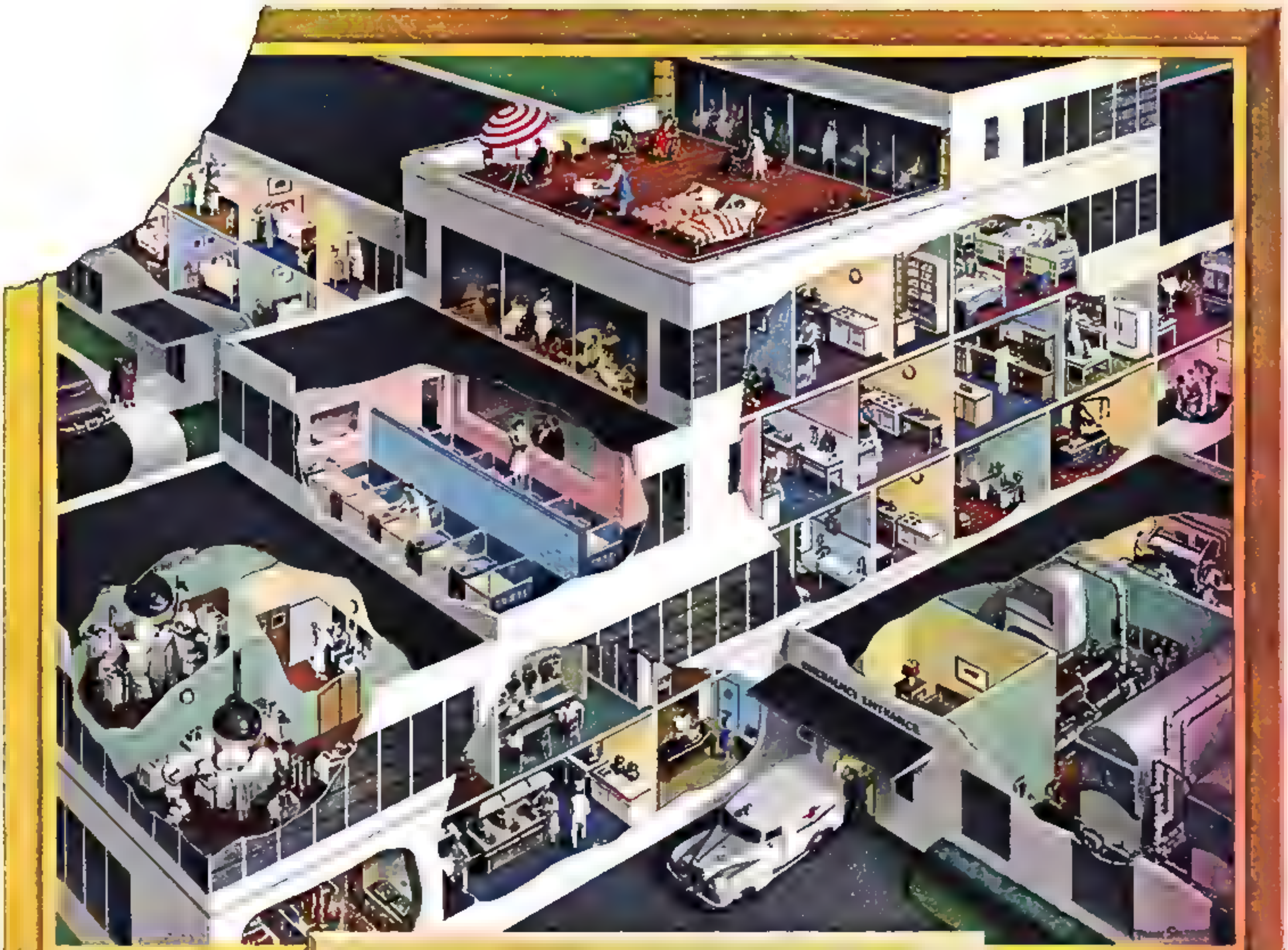


SUNK IN HOLE blasted from solid rock, furnace of New York's big atomic power plant will generate steam and make new fuel at the same time. Elaborate safety precautions include gas-tight steel tanks enclosing steam-generating section. If radioactive hot water should escape through leak in piping, it could not reach the outside air.

is power, not research, and it set out to get a plant that would make electricity practically, safely and cheaply.

"We were pleasantly surprised," remarks the company's bespectacled, professorial engineering v-p, Jim Fairman, "to learn that it wouldn't be as costly as we had feared. The plant will run around $230 a kilowatt. That compares favorably with the $200 a kilowatt we would have to spend for a new conventional plant. Operating costs should be less than at some of our older stations."

Old reliable PWR. The atomic furnace Con Ed chose is a "pressurized water reactor," as tried and tested a



BEHIND THE SCENES IN A HOSPITAL

Prepared by the Armstrong Cork Company, makers of Industrial Insulations, in cooperation with the American Hospital Association

If you want to see how a hospital really operates, look behind the quiet efficiency of the corridors and patients' rooms. Visit places like the boiler room 9, pharmacy 5, blood bank 6, and kitchen 4. There you will find the special services without which a modern hospital could not exist.

On your way, you'll see lots of heat and cold at work. For heat and cold flow through a hospital like lifeblood in its veins. To control that heat and cold and carry it economically where it is needed, hospitals depend on insulation. Many of the insulating materials they use are made and installed by the Armstrong Cork Company.

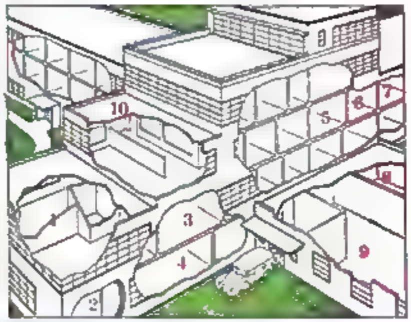
Before the surgeon can operate 1, heat has been at work in the sterilizer 3, making instruments germ-free. Workers in the laundry 8 need heat to wash and iron linens for beds, uniforms for nurses, gowns for surgeons. The cooks 4 must have heat to prepare meals. Steam flows to these places through pipes insulated with 85% Magnesia to keep heat from being wasted.

Cold is vital, too. Drugs, vaccines, serums and plasma in the pharmacy 5, the blood bank 6, and the laboratory 7, are kept fresh and cold in storage refrigerators lined with Armstrong's Temlok® or Fiberglas* insulation. In freezers and cold rooms 2, large quantities of food can be safely held because floors, walls, and ceilings of Armstrong's Corkboard keep heat out. Insulated ice machines turn out ice for cold drinks, ice bags, and physiotherapy treatments.

For everybody's comfort, the roofs 10 are insulated against summer sun and winter cold with Armstrong's Corkboard. In the machine room 9, insulated equipment supplies the operating rooms and nursery with conditioned, dust-free air through ducts covered with corkboard. Here, too, is the boiler which heats the building and supplies power for the emergency electrical generator. Armstrong's Insulating Fire Brick saves fuel in this boiler.

In institutions, as in hundreds of industries, Armstrong Insulations make heat and cold work with less waste. If you have a problem involving the use of heat or cold, a trained engineer in a near-by Armstrong office will be glad to help you.

ART PRINT FREE: This painting and diagram, enlarged to 21" x 22" in full color, suitable for framing. Write to Armstrong Cork Company, Building Materials Division, 4903 Marietta Ave., Lancaster, Pa.

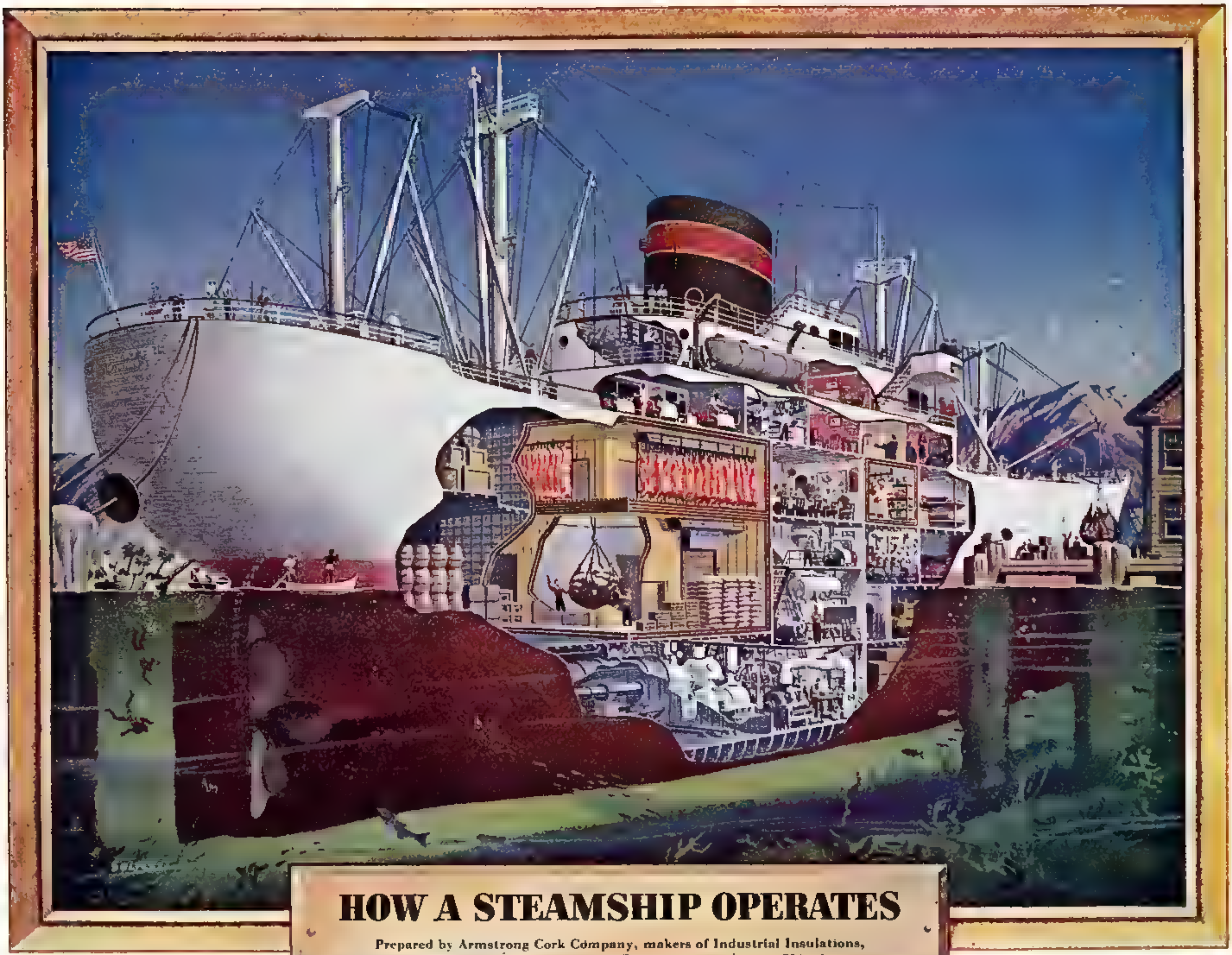


*® OCF Corp

ARMSTRONG'S INDUSTRIAL INSULATIONS

MATERIALS INSTALLATION

FOR ALL TEMPERATURES FROM 300° F. BELOW ZERO TO 2800° F.



HOW A STEAMSHIP OPERATES

Prepared by Armstrong Cork Company, makers of Industrial Insulations,
in cooperation with the National Federation of American Shipping

When you take that cruise you've dreamed about, you may sail on a ship like this. From the swimming pool **2** to your air-conditioned stateroom **3**, you'll enjoy the same comforts you would find at a resort hotel ashore. But, below decks, this ship is a hard-working freighter, carrying tons of cargo to many ports of call.

To combine luxurious passenger service with large-scale cargo transport, a steamship is a city afloat. Like a city, a ship has to have its "utilities." Most of them are based on heat and cold. Heat is generated to drive the ship and for many other purposes. Cold is needed for air-conditioned comfort and to guard perishable cargo from spoilage. To avoid wasting valuable heat and cold, a great deal of insulation is built into the structure of a modern steamship. Many of those insulating materials are made and installed by the Armstrong Cork Company.

In the lounge **1**, refreshments are served cool and sparkling from a beverage cooler lined, like a refrigerator, with Armstrong's Corkboard, Temlok®, or Fiberglas*.

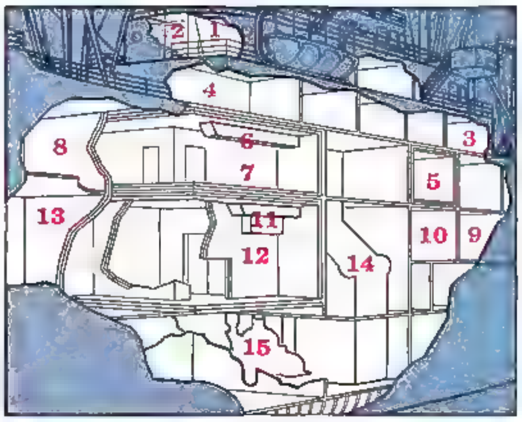
The food you eat in the dining salon **4** is as fresh as the day it was brought aboard because the refrigerated storage room **5** is surrounded with thick corkboard insulation.

Specially built refrigerated holds **7, 12** called "reefers" are filled with meat, fruits, and other perishables. Air chilled by refrigerant from the machine room **10** enters through corkboard-insulated ducts **6, 11**. More layers of Armstrong's Corkboard cover decks, bulkheads, and doors to keep heat out. General cargo is stowed at **9, 8, 13**.

Steam that drives the ship's turbines **15** is generated in the boiler **14**. To save fuel, the boiler is lined with Armstrong's Insulating Fire Brick. To keep the steam hot, the pipes that deliver it throughout the ship are covered with magnesia insulation.

Ashore, as at sea, Armstrong's Insulations have been serving industry for more than forty years. If you have a problem of keeping heat or cold where it belongs, there's a trained engineer in a near-by Armstrong office who will be glad to help you.

SEND FOR ART PRINT . . . Enlargement of above picture, 21" x 22", in full color ready for framing. No charge. Just write Armstrong Cork Co., Building Materials Division, 4711 Marietta Ave., Lancaster, Pennsylvania.



*® OWENS-CORNING FIBERGLAS CORP

ARMSTRONG'S INDUSTRIAL INSULATIONS

MATERIALS INSTALLATION

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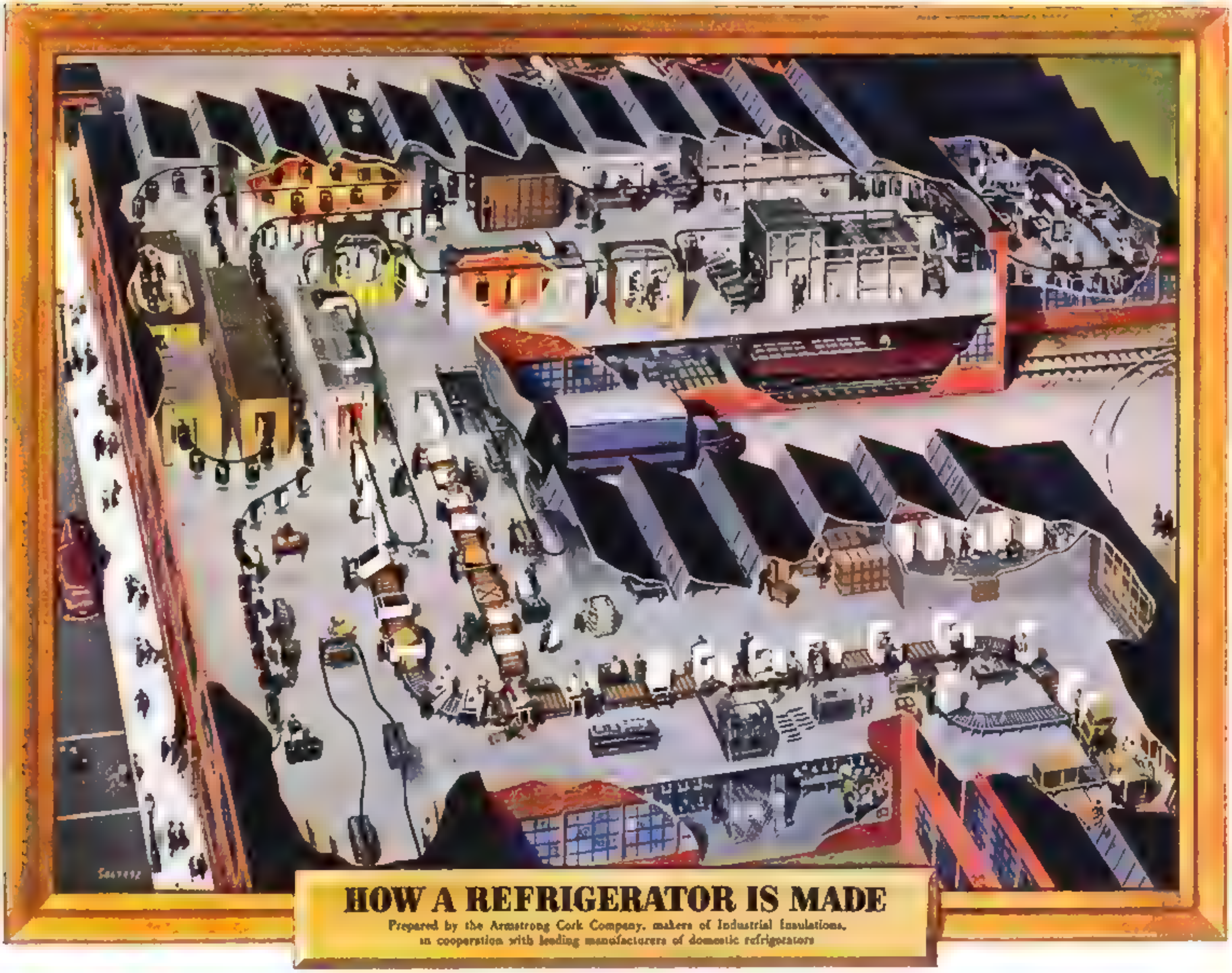


HOW A REFRIGERATOR IS MADE

Prepared by the Armstrong Cork Company, makers of Industrial Insulations,
in cooperation with leading manufacturers of domestic refrigerators

BEFORE we tour this plant, do you know what a refrigerator really is? Most people think it "manufactures cold." Of course, that's wrong. There's no such thing as "cold." It's just the absence of heat. The mechanism of a refrigerator is really a pump that draws heat out. Insulation keeps the heat from getting back in again. The walls of the cabinet are filled with insulation, protected on both sides by a steel shell.

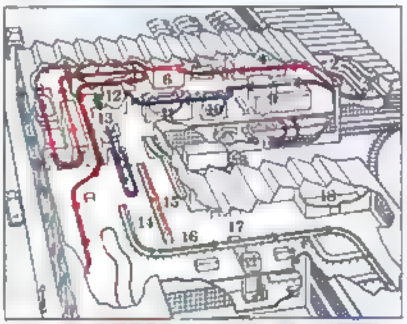
Railroad cars bring the steel in 1, and it moves across the ground floor where giant presses 2 and welding equipment 3 form the doors, the outer shell, and the inner shell, which is called the "liner." The liners are carried upstairs and into acid and chemical baths 4 for cleaning. Then they're dipped in black porcelain 5 and dried 6. In a furnace 7, built of Armstrong's Insulating Fire Brick to keep the inside hot and the outside cool, the porcelain is fused to the steel. The liners get a coat of white porcelain in the spray booth 8, and then go back to the furnace for a final firing.

On another line, outer shells and doors are cleaned 9, the finish is sprayed on 10, 12 and baked in insulated ovens 11, 13.

The outer shell has now reached the main assembly line. Here it is snugly lined with insulation 14, the material that holds heat out. In many refrigerators this insulation is Fiberglas*, supplied by Armstrong. Then the liner goes in, sandwiching the Fiberglas between the two metal walls. The door, also insulated with Fiberglas 15, joins the cabinet 16, and the mechanism is installed 17. Then the complete refrigerator is tested and crated for shipment. At intervals a refrigerator gets special tests in a room 18 built of Armstrong's Corkboard or Foamglas† insulation.

Armstrong has been serving the insulation needs of industry for more than forty years. If you have a problem of keeping heat or cold where it belongs, there's a trained engineer in a near-by Armstrong office who will be glad to help you.

SEND FOR FREE ART PRINT. Enlargement of above picture, in color, 21" x 22", ready for framing. No charge. Just write to Armstrong Cork Company, Building Materials Division, 4805 Marietta Ave., Lancaster, Pennsylvania.



INNER LINER 🟥 OUTER SHELL 🟦
DOOR ASSEMBLY 🟧 MAIN ASSEMBLY 🟩

*[illegible] †[illegible]

ARMSTRONG'S INDUSTRIAL INSULATIONS

MATERIALS INSTALLATION

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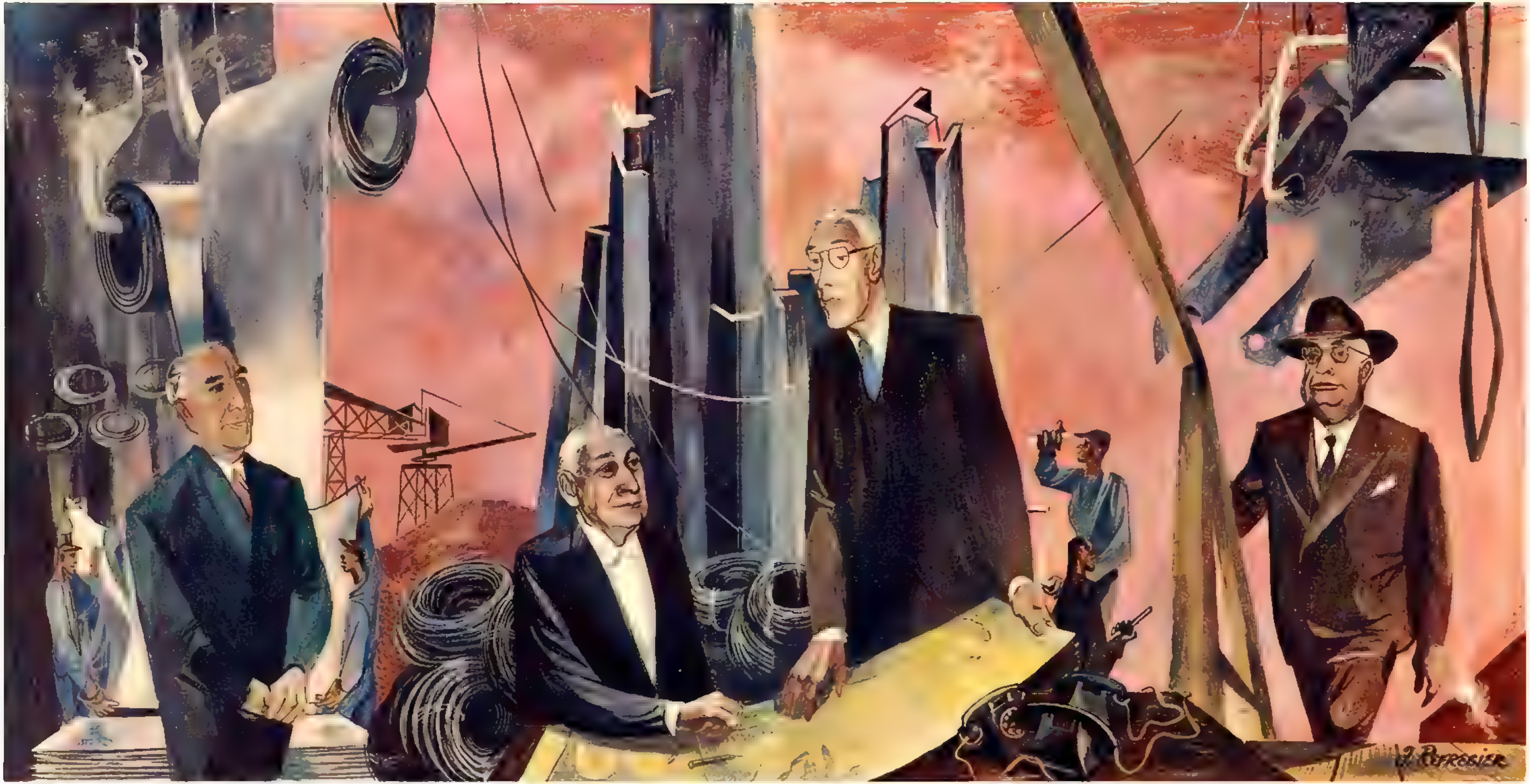


RICHARD S. REYNOLDS

The only aluminum thing bigger than Alcoa in 1940 was the area of aluminum foil manufactured by one of Mr. Reynolds' twenty-four small companies—the Reynolds Metals Co. Now Mr. Reynolds, an effervescent, romantic, hard-driving Southerner who sleeps in a replica of Napoleon's bed and writes spare-time verse, is in aluminum up to his ears. Reynolds Metals makes everything out of aluminum it can think of. Mr. Reynolds came logically into aluminum foil out of his family's tobacco business.

ARTHUR V. DAVIS

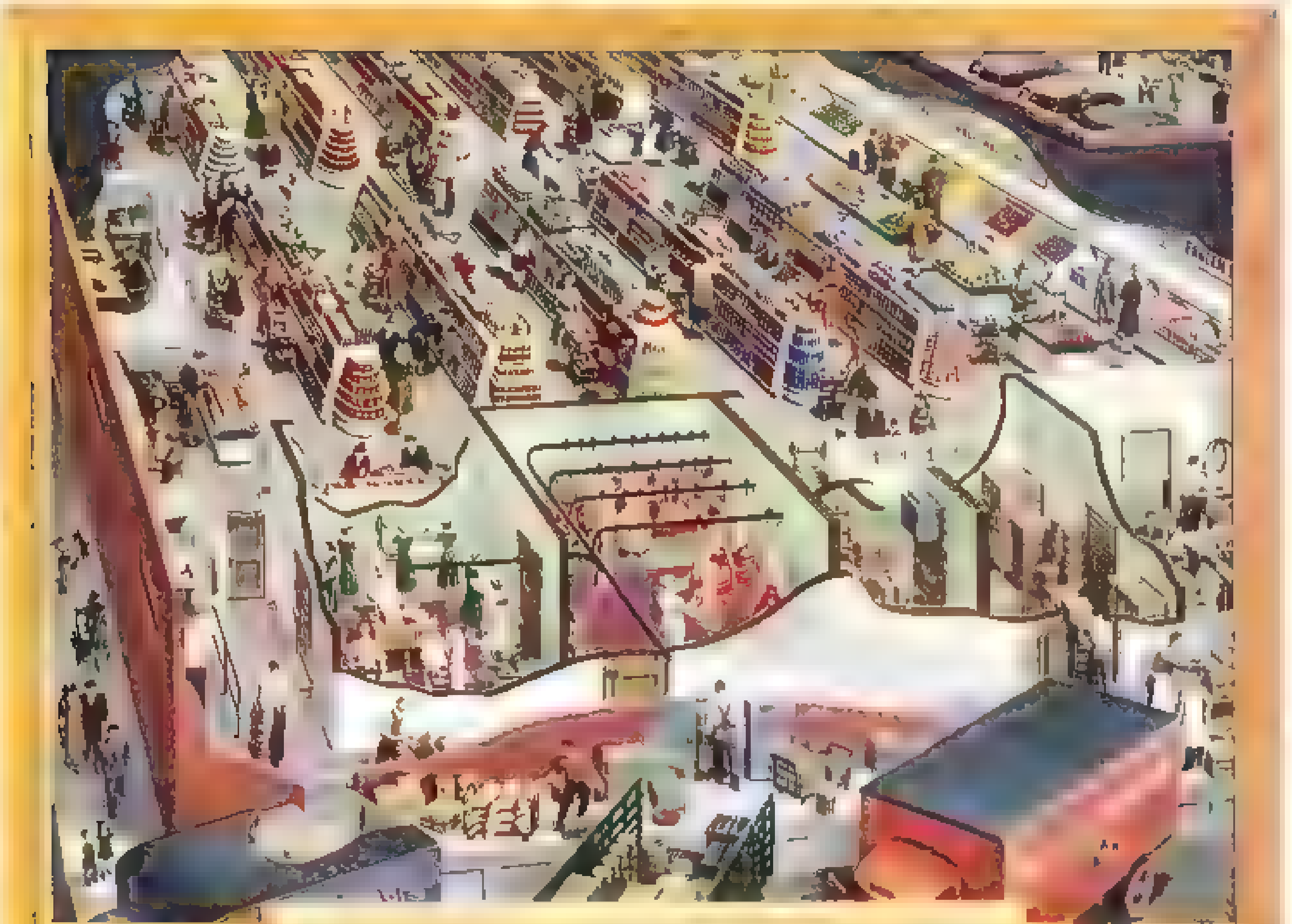
Not long ago Mr. Davis discovered that he was "a very rich man." He found fifty two cases of 1909 Old Overholt whiskey—now valued at $52 a bottle which he had bought in 1917 and forgotten. Mr. Davis, the son of a Congregational minister, does not drink whiskey. At seventy-eight, he drinks several Martinis before dinner, has eaten no lunch for twenty years. Incidentally, he owns $50 million worth of stock in Alcoa and Aluminium, Ltd., and runs practically a one-man show as Alcoa's Board Chairman.

IRVING W. WILSON

Right-hand man to Chairman Davis and professional front man for Alcoa is this lanky, dexterous Vice President in charge of operations. Mr. Wilson, who —like most of the other top executives in the company—has never worked anywhere else, thinks that competition in the aluminum industry is fine so long as it is "the right kind." Pressed for definition, he replies that two grocers on one street are good for business, but you can't expect the first one there to invite the other one in.

HENRY J. KAISER

Out of the nowhere into the aluminum here comes Mr. Kaiser, of course. The government, on the theory that three competitors are better than two, was delighted to meet him more than halfway with favorable terms for leases on the DPC ingot plant and rolling mill at Spokane. Mr. Kaiser thinks he can make enough things out of aluminum—including automobiles—to use the full capacity of these huge plants. If so he won't be much bother to Alcoa and Reynolds. If not he probably won't be either.



BEHIND THE SCENES IN A FOOD MARKET

Prepared by the Armstrong Cork Company, makers of Industrial insulations, in cooperation with the National Association of Retail Grocers

WATCHING what goes on in the rear of a modern food market is like a trip backstage in a theater. Here's where you can really see how food is handled—and a fascinating sight it is. All day long a steady stream of groceries moves from the trucks to the shelves up front.

Perishable foods, of course, require special care. They depend upon low temperatures to keep them fresh and appetizing, and insulation is needed to help maintain and control these low temperatures. Many of these insulations used in a modern food store are made and installed by the Armstrong Cork Company.

There's an ideal temperature for keeping every perishable food, and it must be maintained from the time the food leaves the processing plant until you buy it in the store. For example, meat comes in a refrigerated truck [illegible] that is insulated with Armstrong's Corkboard or Fiberglas.* Then it goes to a cooler [illegible] where it's stored at 34°F, and [illegible] it's needed in the cutting and wrapping room [illegible]. Both of these rooms are built of Armstrong's corkboard so that the temperature can be held exactly right. After it's wrapped, meat is put in the self-service display case [illegible] which is also insulated with corkboard or Fiberglas and held at 36°.

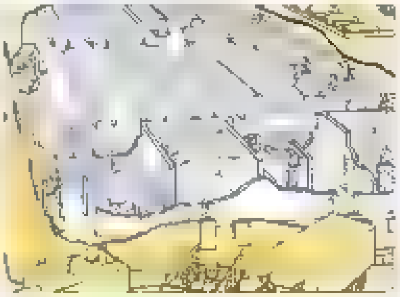
Store ice cream and frozen foods must be held at zero—a separate storage room [illegible] is needed. It's built with a greater thickness of corkboard to help keep those foods frozen hard. On the retail floor, ice cream is kept in an insulated cabinet [illegible] and frozen foods in an insulated display case [illegible]. Dairy products move right from the trucks to the insulated cases where they're stored at 40°.

Fresh fruits and vegetables also get special attention to keep them close to the ideal 48°. They're delivered to another corkboard-lined room [illegible]. Then vegetables are trimmed and washed [illegible] before you buy them from refrigerated display cases [illegible].

Retail food stores are the final links in a vast food distribution system that has used Armstrong's Industrial Insulations for almost 50 years to store, transport, and market its products successfully. If you have a problem involving heat or cold, call one of the trained engineers in a nearby Armstrong office. He will be glad to help you.

* OCF Co.

ART PRINT FREE: This picture and flow chart, enlarged to [illegible] in full color suitable for framing. Write [illegible] Armstrong Cork Company, Building Materials Division, [illegible] Ave., Lancaster, Pa.



ARMSTRONG'S INDUSTRIAL INSULATIONS

[illegible]

Steel fingers—

with a tender touch

JOHN DEERE, big name in farm equipment, is a leader in the mechanization of modern farms. Shell Industrial Lubricants are used in its plants, as well as in the machines produced.

STEEL FINGERS now pick King Cotton, and careful mechanical hands are at work in the nation's cornfields.

In building all types of farm equipment from tractors to dusters, John Deere takes into account the rugged life such machines must lead. Correct lubrication, during building and use, is always emphasized.

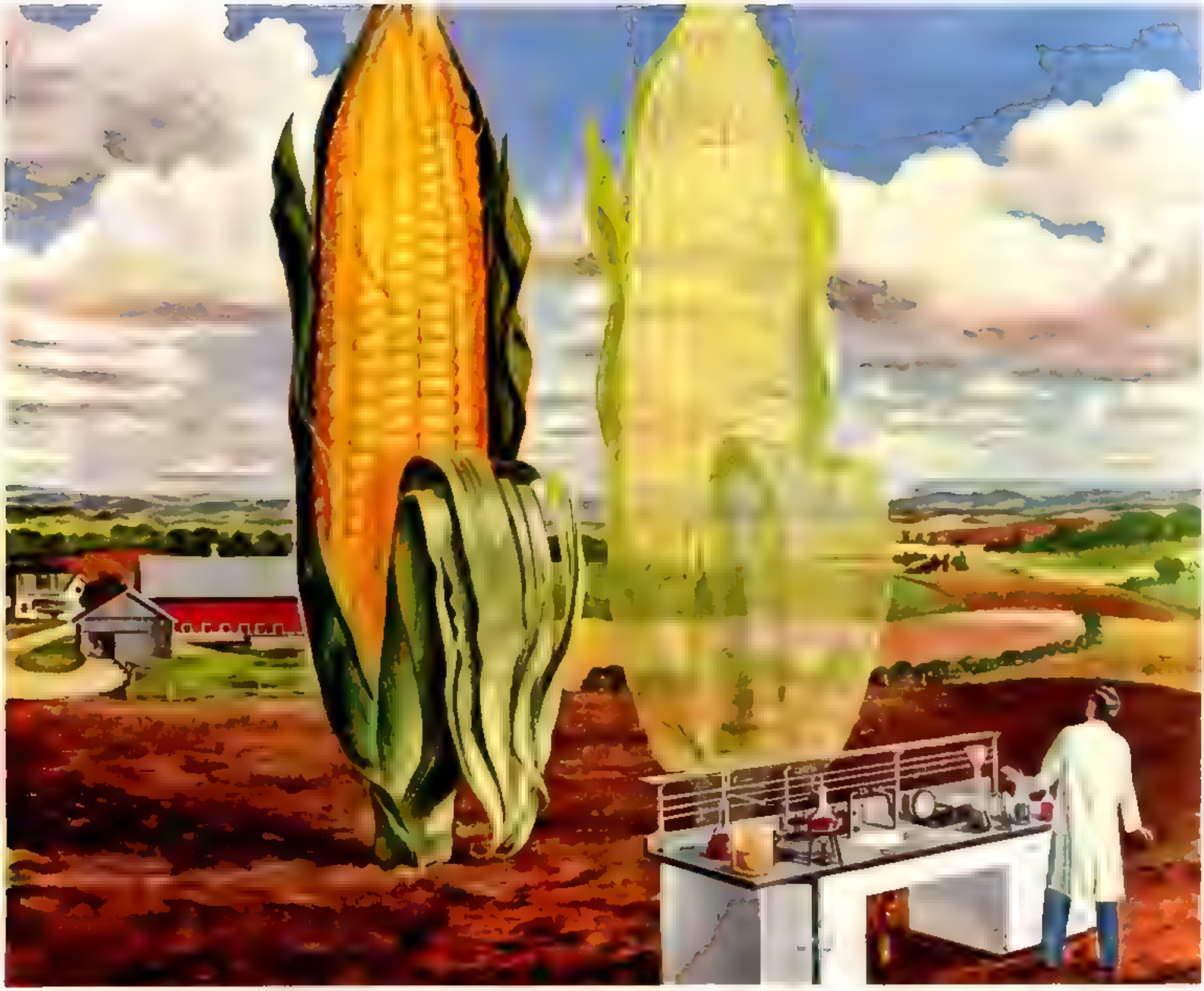
To assure this, John Deere engineers and maintenance men work closely with Shell lubrication engineers—carefully test and apply products of Shell Research. Lubrication uses range from hydraulic oils . . . to machine tool oils . . . to gear greases and lubricants for use in their equipment as it works on the farm. Lubrication problems, when they occur, are promptly solved. But in most cases, says John Deere, they are *never allowed to develop.*

Development of better industrial lubricants is only one example of Shell leadership in the petroleum industry. Shell Research is your assurance of better quality . . . *more for your money* —when you buy products bearing the Shell name and trade-mark.

SHELL

Shell Research leads
to New Products—
more for your money

© 1952, SHELL OIL COMPANY



[illegible]

FOOD FROM THOUGHT

AT A DOWN-TO-EARTH center of research, the new Shell Agricultural Laboratory, "Doctors in Overalls" apply experiments to 142 acres of typical North American farmland.

No. 1 crop raised by these scientists and their university-trained assistants is new *knowledge*. They seek to grow two ears of corn, or two oranges, or two carrots, where only one grew before. And their knowledge will be passed along to millions of farmers.

Working with county, state and national experts, Shell's agricultural scientists [illegible] news of their discoveries into many channels. In addition to workrooms, the new laboratory includes an auditorium, library and conference room. All work to one end: *the spreading of thought*.

Out of agricultural research, Shell has made available many useful combinations of petroleum molecules—each a "specialist"...

Examples include: Highly refined carriers of agricultural chemicals—such as hormones—which hold fruit on trees, in prime condition, to ease the farmer's picking schedule, and oil base sprays which cling in wind and rain, keeping pests in check.

From petroleum molecules, Shell scientists produced "D-D"* [illegible] which *fumigates* soil, killing plant enemies under ground. With another petroleum derivative, Shell NH[illegible] they provide a potent *enrichment* of soil [illegible] for crops. Still other petroleum products give farmers many effective, low-cost protection against rust.

Shell's scientists, the "Doctors in Overalls," work in many directions [illegible] soil and keep it free of parasites [illegible] from planting time until harvest time. For a hungry world, they seek "two ears of corn where only one grew before."

*Reg. U. S. Pat. Off.

Out of leadership in Research
. . . a remarkable new Shell Gasoline

Just as the Shell Agricultural Laboratory brings new aids to farming, so Shell Research [illegible] new, finer gasoline [illegible]

Corn with strength to fight a Gale

High on the list of food wasters are the winds that flatten ripening corn – making it impossible or uneconomical for farmers to harvest the crop.

Actually, this waste *begins in the Spring*, when rootworms attack the tender roots, weakening them so that the mature plant is a pushover for any stiff breeze. And puny roots mean puny corn.

Now farmers have a chemical ally which can go underground to control these soil insects – Shell Aldrin. So effective is Aldrin that as little as a pound will protect an acre of corn. Aldrin is easy and inexpensive to apply. It gives corn strength to fight a gale. And it leads to bigger, healthier crops.

Nor is use of Aldrin confined to corn and soil insects. Pests which attack cotton, tobacco, cane, small grain, peanuts, grass – almost any crop you can name – are brought under control *and kept there* by this new insecticide.

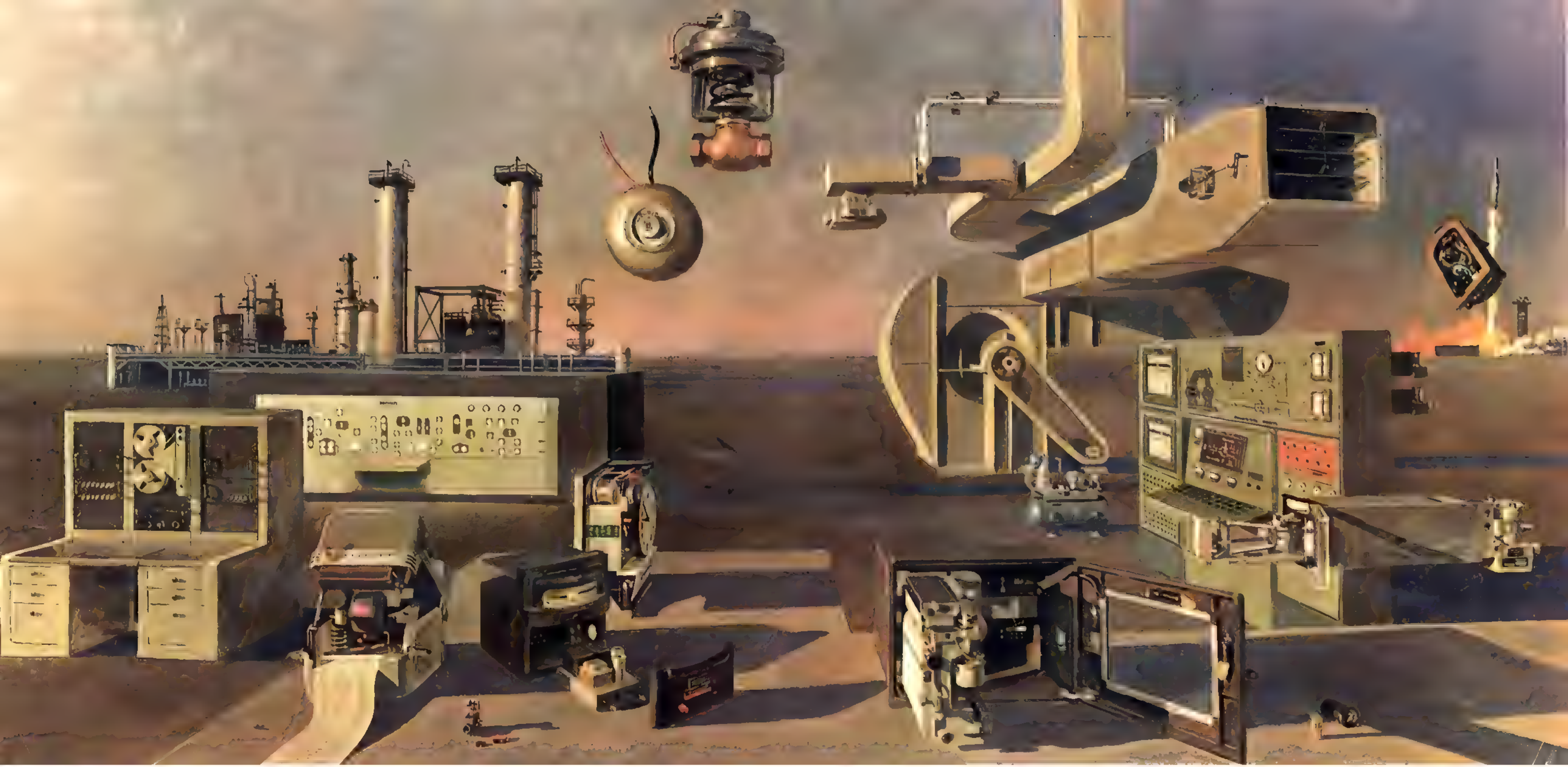
Bringing Aldrin to the farmer is another example of Shell leadership in the petroleum industry.

Shell Research leads to better value, *more for your money*, when you buy products bearing the Shell name and trademark.

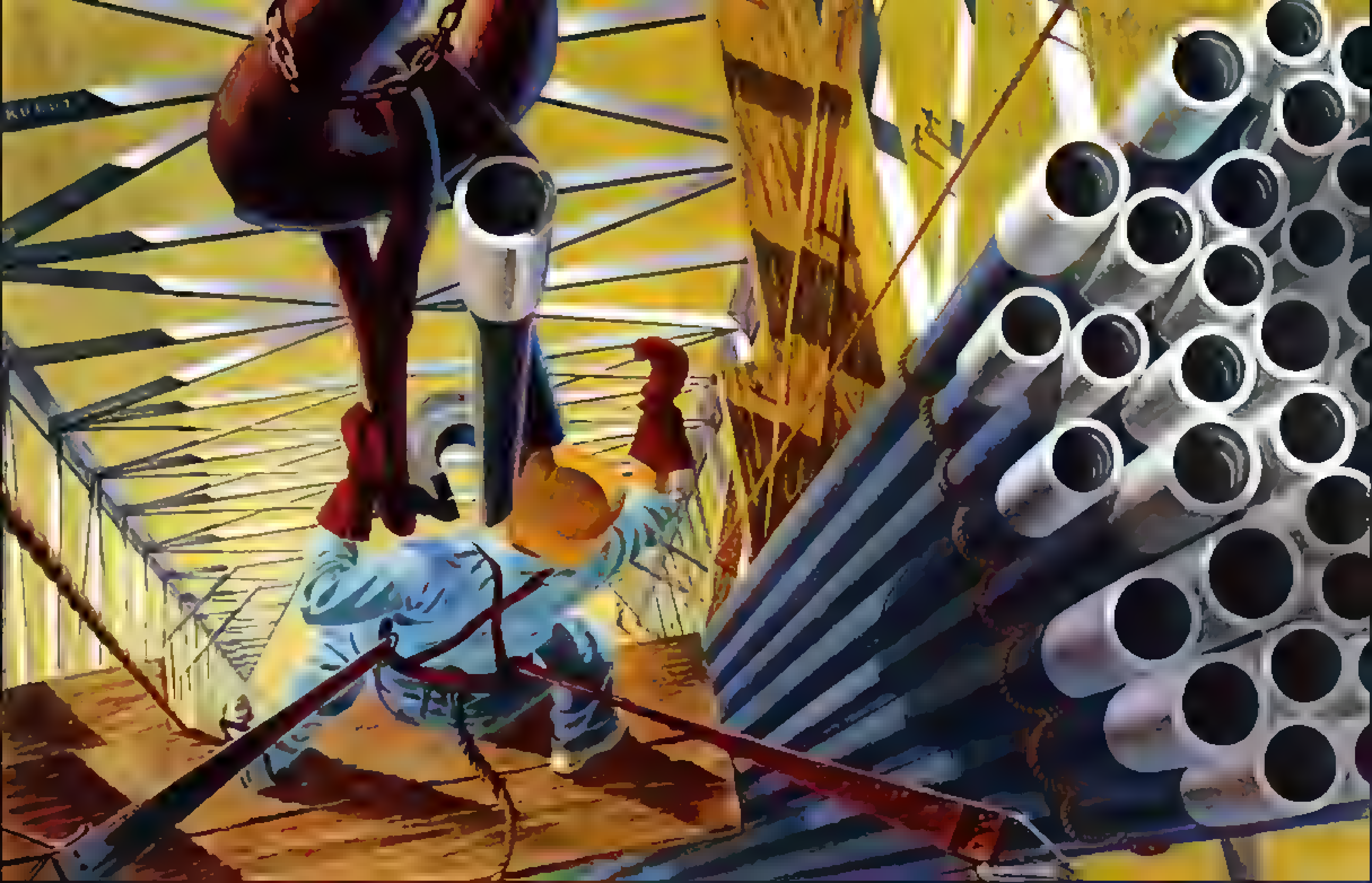
SHELL

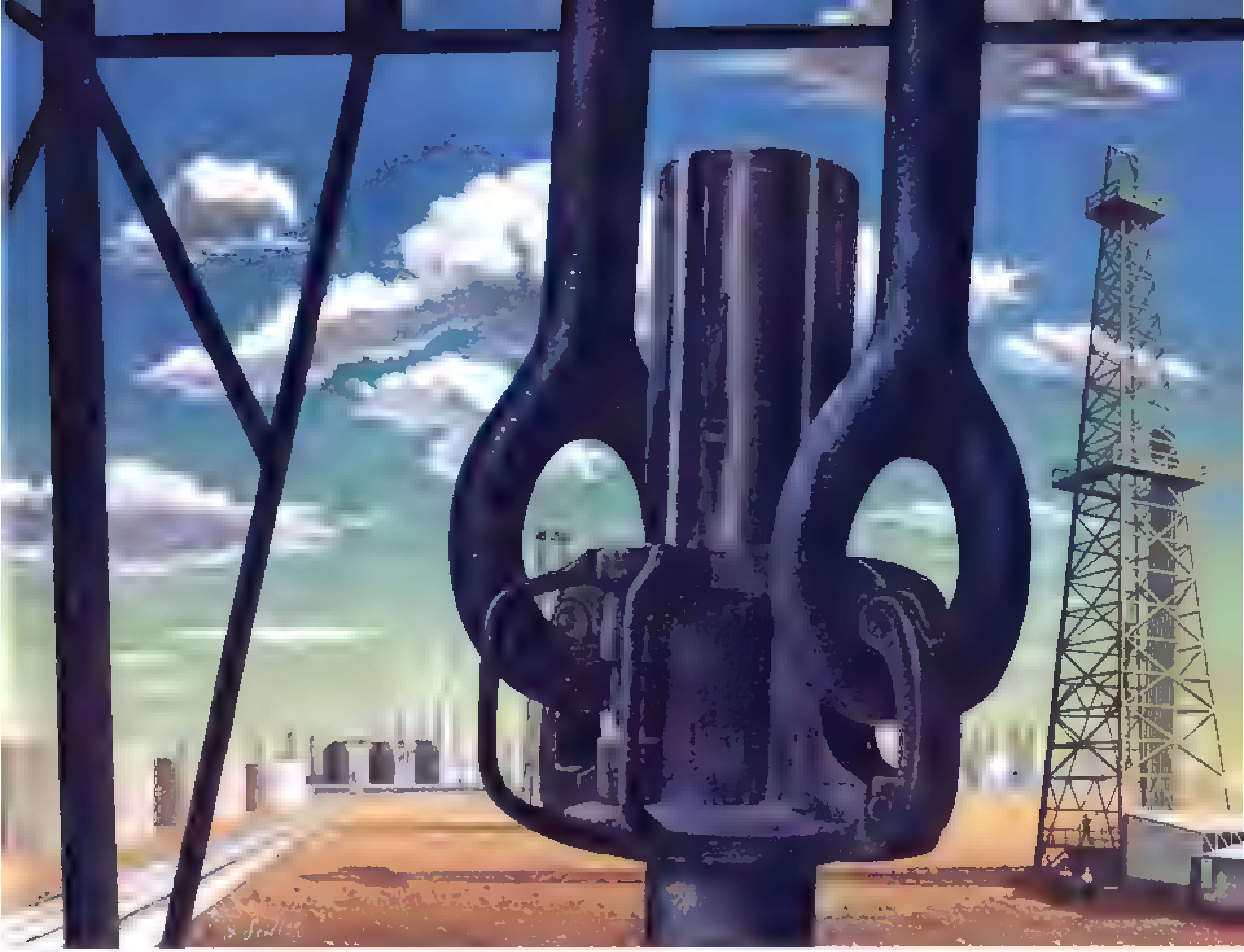
[illegible]

© [illegible] COMPANY



This is artist Nicholas Solovioff's sampling of the world of Minneapolis-Honeywell. From the company's 13,000 products, Solovioff has chosen for this landscape: (1) Colorgraphic control panel for a section of a fully automated oil refinery (seen in background); (2) data recording and transcribing console of an industrial digital computer; (3) Visicorder recording oscillograph, which spews out thirty six separate channels of information on graph paper at rates up to 160 inches a second; (4) power transistors; (5) several versions of the Micro Switch, used in everything from appliances to planes; (6) Pyr-O-Vane, the regulator of fuel flow or power supply in industrial furnaces and ovens; (7) ClockMaster, for timing the clocks and ringing the bells in schools, (8) the famous Honeywell round thermostat; (9) pneumatically operated diaphragm valve that responds to the thermostat and controls the flow of water or steam in the ventilating systems that are shown at right; (10) pneumatic piston motor, also controlled by the thermostat, which opens and closes the dampers on ventilating ducts; (11) Honeywell compressor, supplying air for pneumatic controls, (12) ElectroniK potentiometer a basic industrial instrument for measuring and recording heat, speed, flow, pressure, conductivity; (13) Supervisory DataCenter, which regulates air conditioning and heating in commercial buildings; (14) recording controller, one of a series of units in the integrated Tel-O-Set system of devices that record data at one end, regulate industrial valves at the other; (15) Golden Gnat miniature rate gyro, used in autopilots and guidance systems to measure a plane's or missile's rate of deviation from an axis; (16) capacitance fuel indicator for aircraft; (17) inertial platform, heart of guidance systems for missiles.





Petroleum...*and The National City Bank of New York*

No nation can hope for leadership in today's world without access to the products of a modern petroleum industry.

For ours is a civilization of wheels . . . and petroleum keeps the wheels turning. As a source of power, it drives an ever-increasing number of automobile, truck, and train wheels; and those modern modifications of wheels, ship and airplane propellers. And as a lubricant, petroleum alone makes possible the high-speed whirring of all the wheels in modern machinery.

As you might expect, the United States swallows petroleum products in Gargantuan gulps . . . in 1949, more than seven billion dollars' worth, *wholesale!* To get these products out of the ground and to the consumers' wheels and gears, the petroleum business called upon assets totaling more than 32.5 billion dollars. In the process, it paid—and generated—more than 3.5 billion dollars in State and Federal taxes.

Business on this scale calls for banking services of comparable scope. This is why you'll find the great petroleum companies and other domestic and world-wide corporations turning to The National City Bank of New York for day-to-day banking services. This Bank's services are quickly available, in the United States and throughout the world.

In the domestic division National City has 67 branches in Greater New York and correspondent banks in every state. Overseas it has 54 branches and correspondent banks in every commercially important city of the world.

Member Federal Deposit Insurance Corporation

First in World Wide Banking

IBM's pioneering research and development in the application of the science of electronics to computing machines have added greatly to the reach and scope of man's creative activity.

Through the use of electron tubes such as the one shown above, IBM has produced machines which are hundreds of times faster than calculators based on mechanical principles. Accurate answers to scientific and business problems involving the most complicated mathematics are being obtained in minutes instead of hours, days instead of months.

Through IBM Electronic Machines, the human mind is finding new release from mathematical drudgery.

IBM products using electronic principles:

- Card-programmed Calculator
- Calculating Punch
- Statistical Machine
- Alphabetical Collator
- Punched Card Sorter
- Electric Time System with Electronic Self-regulation.

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION
World Headquarters Building
590 MADISON AVENUE • NEW YORK 22, NEW YORK

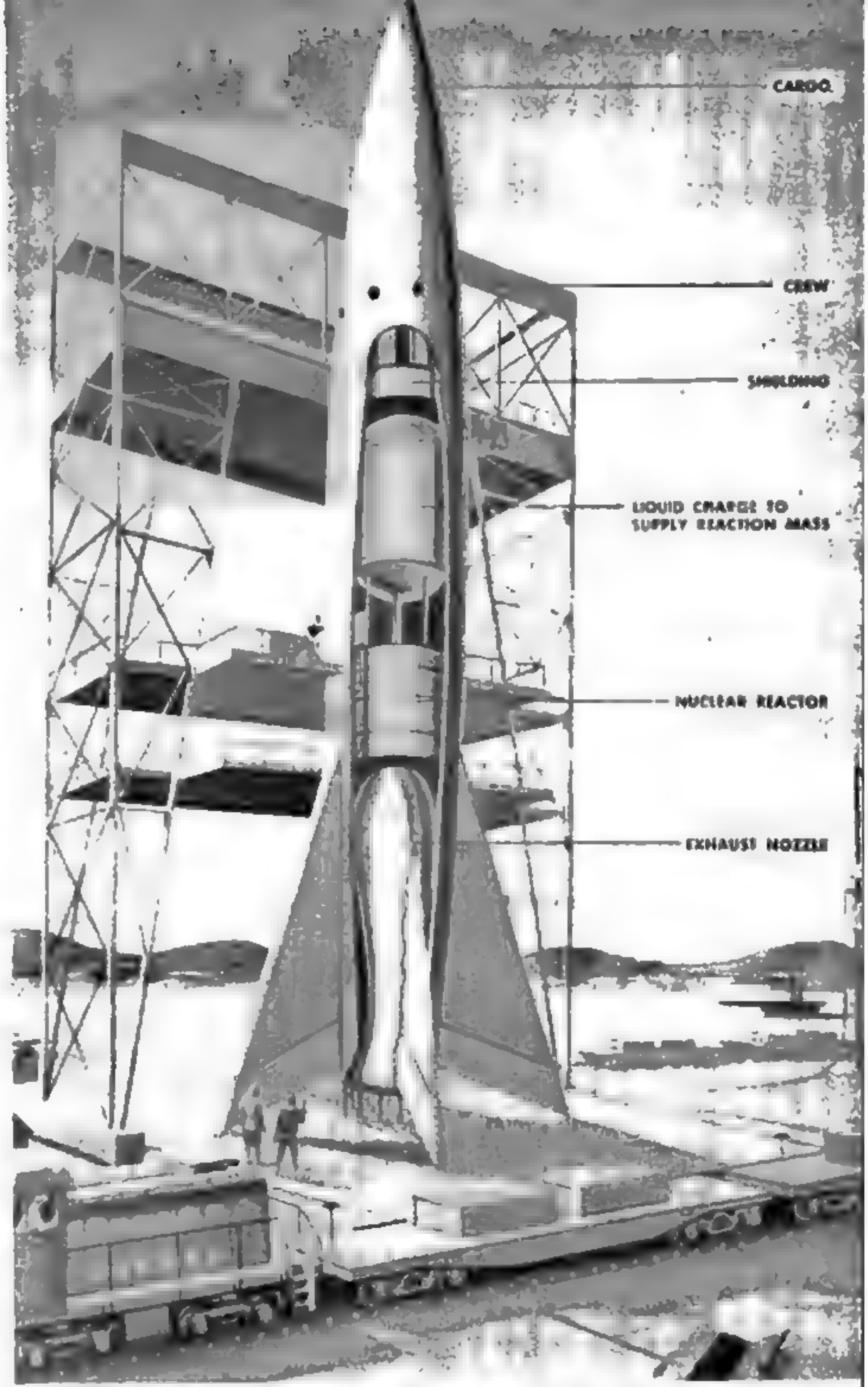
TOMORROW:

Atomic Travel

LOOKING ahead, experts foresee that we'll travel in ships like the ones pictured on this page.

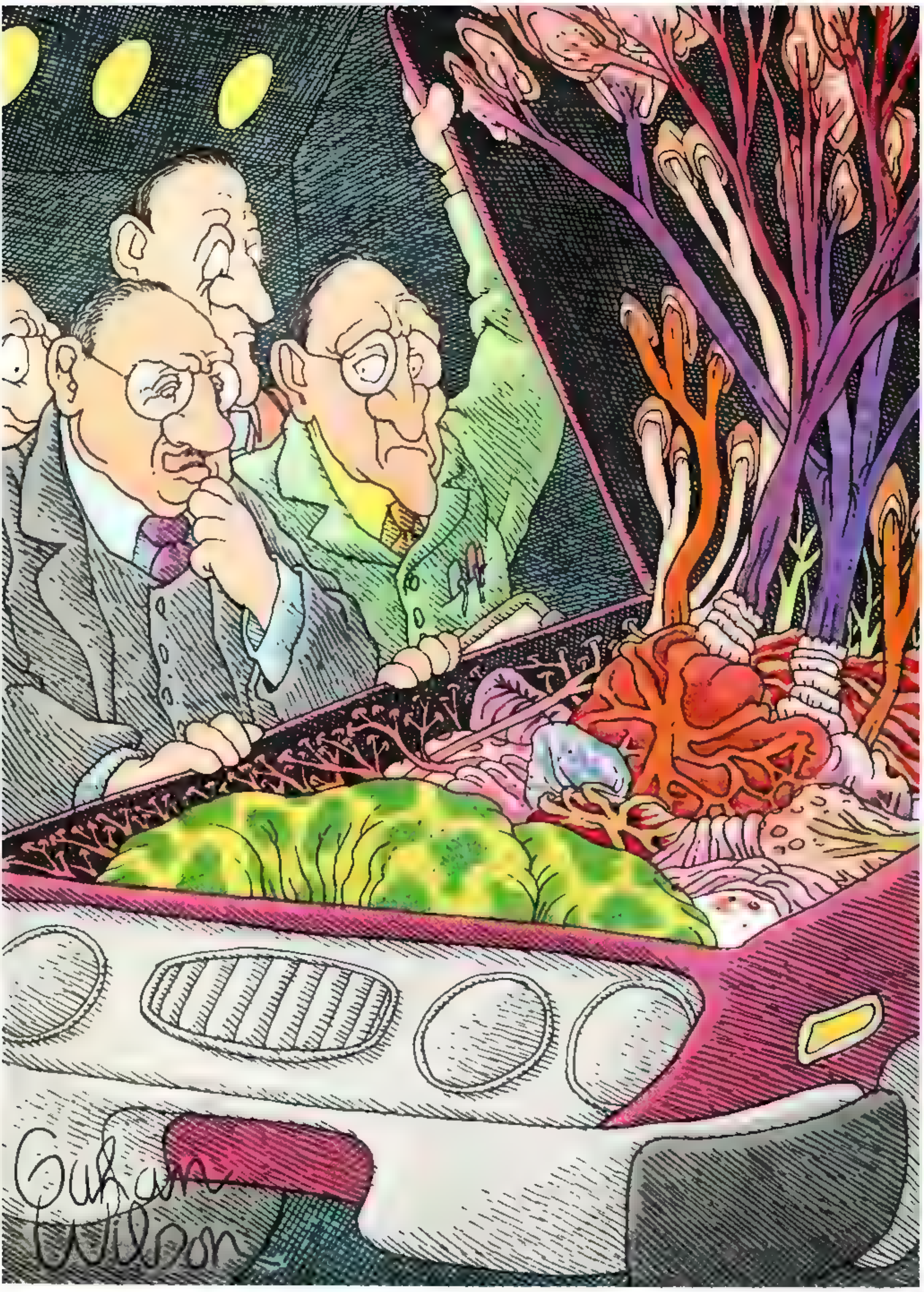
Atomic ocean liners may be near. Since last October, the Bethlehem Steel Company's shipbuilding division has been perfecting plans for the 500-passenger, 600-foot vessel illustrated below. It would have long range without refueling, and dispensing with fuel-oil tanks would make more room for cargo.

An atomic spaceship, General Electric engineers say, awaits more novel and distant developments: a reactor yielding electricity directly, and an engine shooting a jet of electrified particles rearward for propulsion. Laboratory experiments suggest that both may be possible.

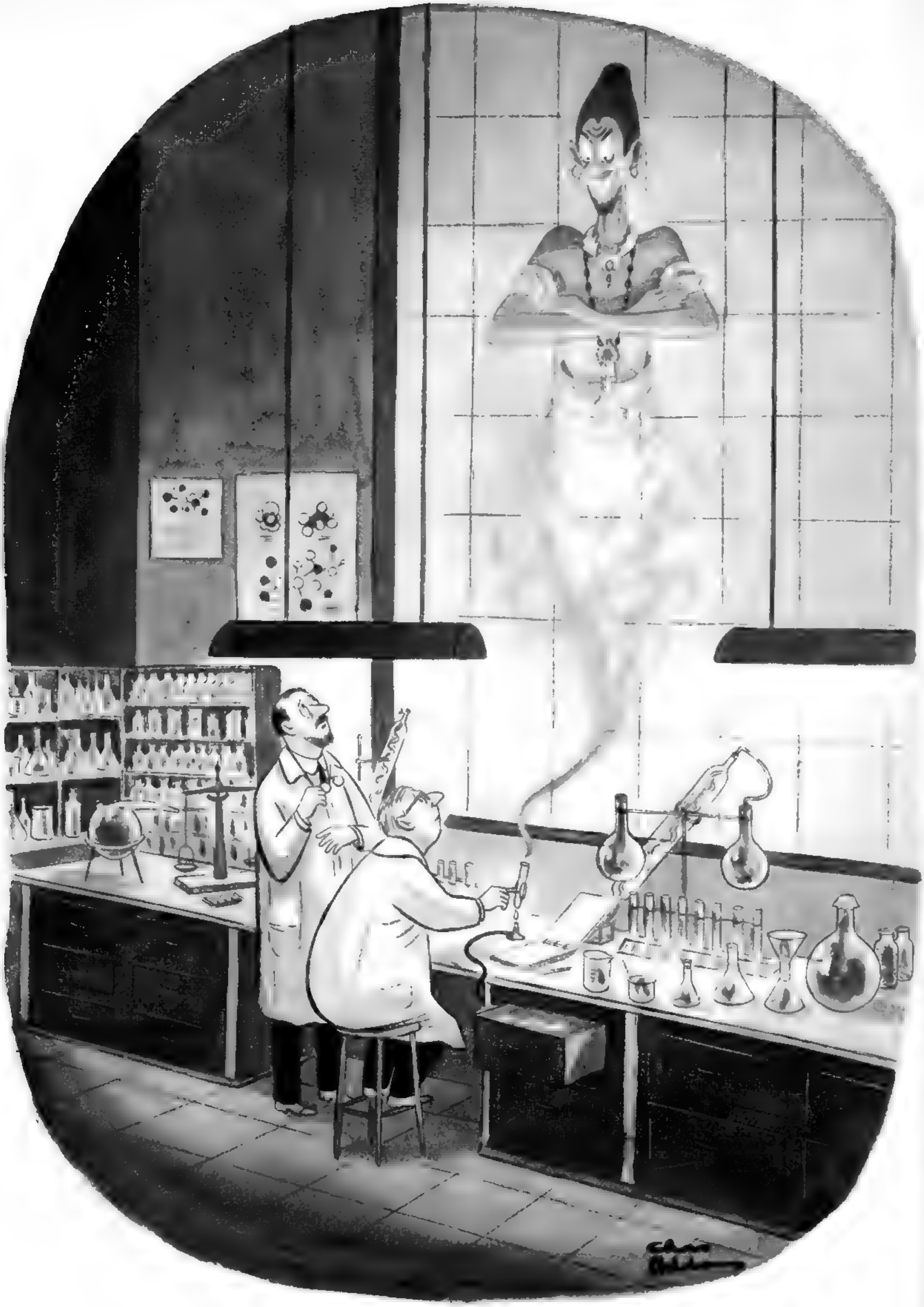


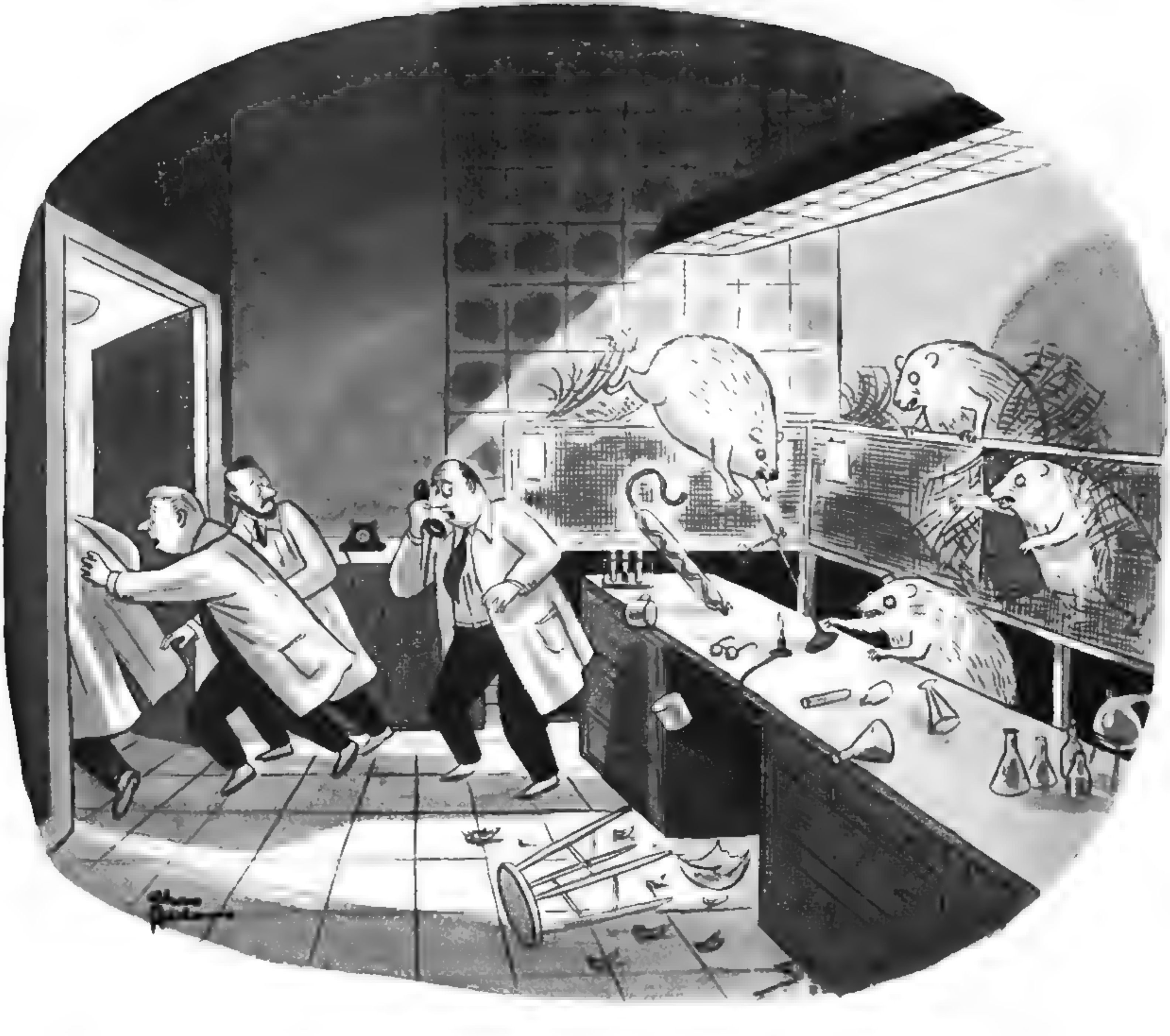
Atomic spaceship, still far in future, may look like this.

Atomic liner may come soon. Stackless reactor makes steam to drive turbines and screws.

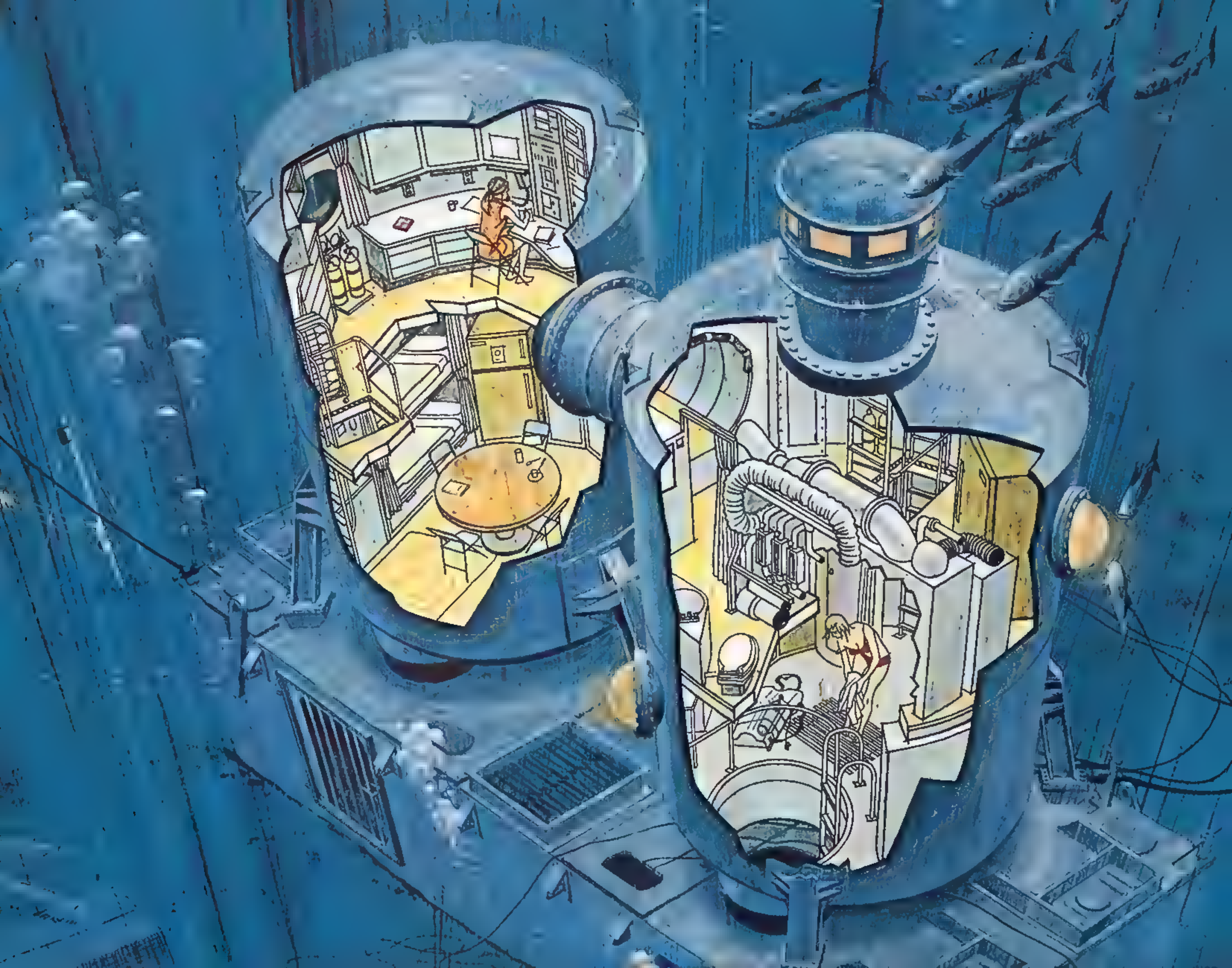


"I'm just not sure the general public is ready for this, Foster."


Chas Addams



"Sanders speaking. Stop all production on XP15, recall all shipments, wire every doctor in the country, and hurry!"



OCEAN – SYSTEMS

Three of a Kind for Power!

Remember when your car was new? That feeling of limitless power every time you stepped on the gas? You took hills, sand, mud, traffic, like a breeze. But how long did that "new car" feeling last? Cars are like people. You've got to feed them right to keep them full of fight. That's why over 1,000 people a minute feed their cars at the Mobilgas pump. They get pep, power, high anti-knock – every quality modern cars thrive on. And with this diet goes the Friendly Service that's made the Red Horse Sign famous from coast to coast. But see for yourself! Fill up with Mobilgas, protect your engine with clean Mobiloil, then you'll have a Fresh Start for the miles ahead.

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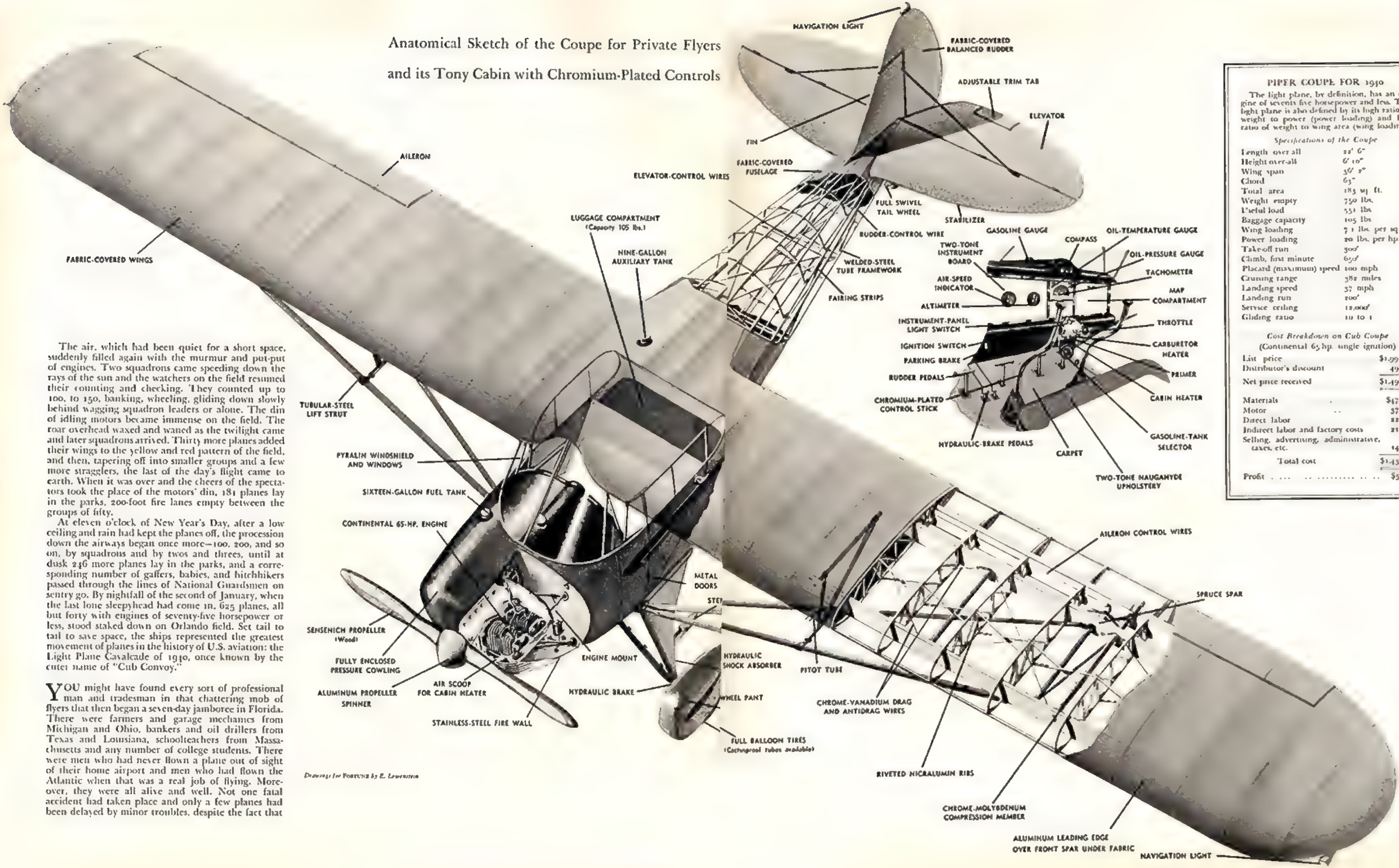
Anatomical Sketch of the Coupe for Private Flyers and its Tony Cabin with Chromium-Plated Controls



Drawings for FORTUNE by E. Lowenstein

PIPER COUPE FOR 1940

The light plane, by definition, has an engine of seventy five horsepower and less. The light plane is also defined by its high ratio of weight to power (power loading) and low ratio of weight to wing area (wing loading).

Specifications of the Coupe

Length over all	22' 6"
Height over-all	6' 10"
Wing span	36' 2"
Chord	63"
Total area	183 sq. ft.
Weight empty	750 lbs.
Useful load	551 lbs.
Baggage capacity	105 lbs.
Wing loading	7.1 lbs. per sq. ft.
Power loading	20 lbs. per hp.
Take-off run	300'
Climb, first minute	650'
Placard (maximum) speed	100 mph
Cruising range	382 miles
Landing speed	37 mph
Landing run	200'
Service ceiling	12,000'
Gliding ratio	10 to 1

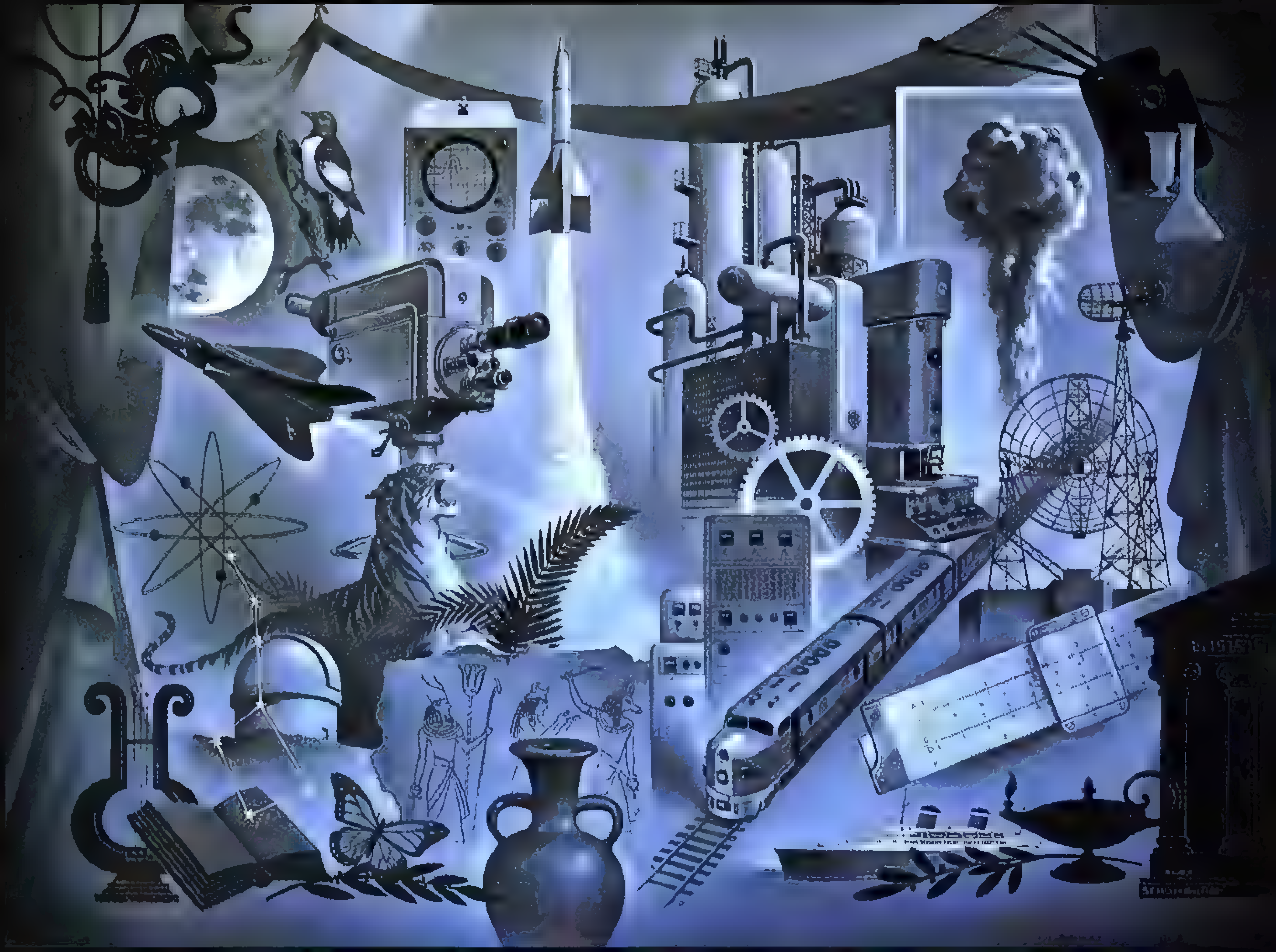
Cost Breakdown on Cub Coupe
(Continental 65 hp. single ignition)

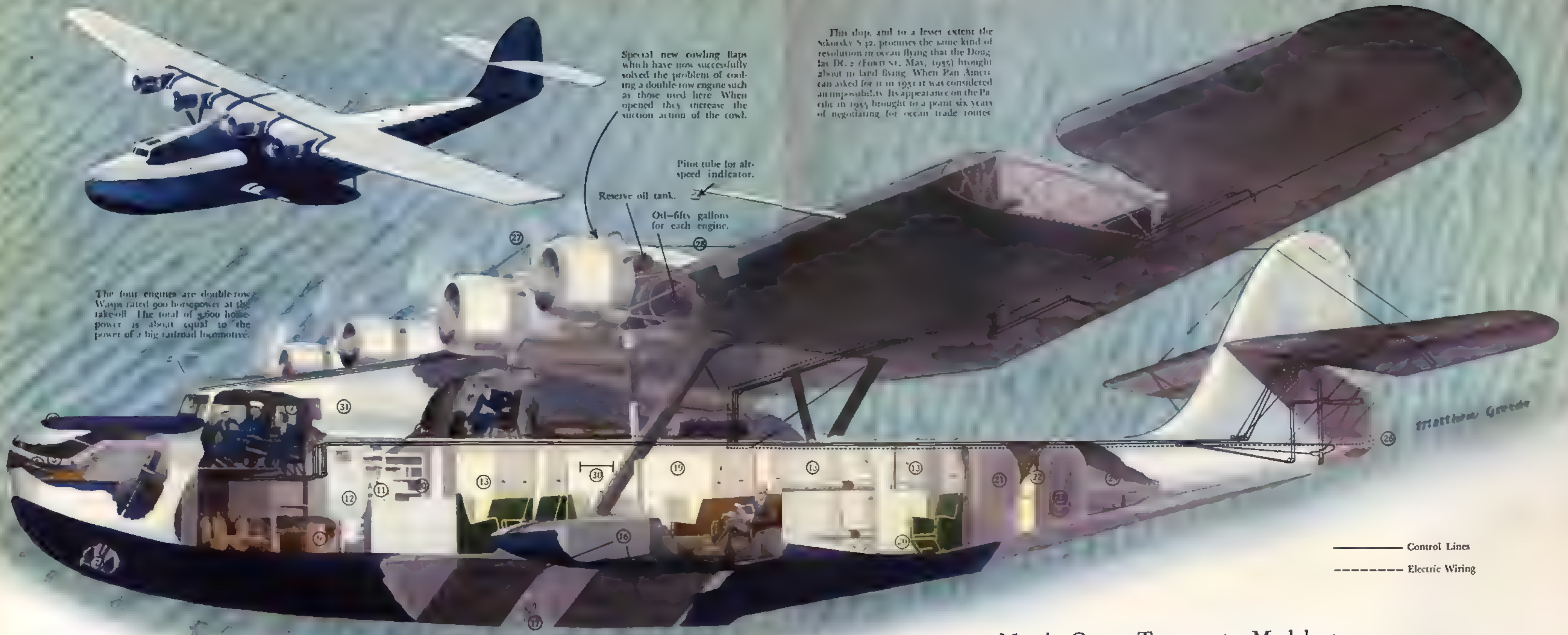
List price	$1,995.00
Distributor's discount	498.75
Net price received	$1,496.25
Materials	$475.75
Motor	373.00
Direct labor	225.00
Indirect labor and factory costs	215.00
Selling, advertising, administrative, taxes, etc.	147.65
Total cost	$1,436.40
Profit	$59.85

The air, which had been quiet for a short space, suddenly filled again with the murmur and put-put of engines. Two squadrons came speeding down the rays of the sun and the watchers on the field resumed their counting and checking. They counted up to 100, to 150, banking, wheeling, gliding down slowly behind wagging squadron leaders or alone. The din of idling motors became immense on the field. The roar overhead waxed and waned as the twilight came and later squadrons arrived. Thirty more planes added their wings to the yellow and red pattern of the field, and then, tapering off into smaller groups and a few more stragglers, the last of the day's flight came to earth. When it was over and the cheers of the spectators took the place of the motors' din, 181 planes lay in the parks, 200-foot fire lanes empty between the groups of fifty.

At eleven o'clock of New Year's Day, after a low ceiling and rain had kept the planes off, the procession down the airways began once more—100, 200, and so on, by squadrons and by twos and threes, until at dusk 246 more planes lay in the parks, and a corresponding number of gaffers, babies, and hitchhikers passed through the lines of National Guardsmen on sentry go. By nightfall of the second of January, when the last lone sleepyhead had come in, 625 planes, all but forty with engines of seventy-five horsepower or less, stood staked down on Orlando field. Set tail to tail to save space, the ships represented the greatest movement of planes in the history of U.S. aviation: the Light Plane Cavalcade of 1940, once known by the cuter name of "Cub Convoy."

YOU might have found every sort of professional man and tradesman in that chattering mob of flyers that then began a seven-day jamboree in Florida. There were farmers and garage mechanics from Michigan and Ohio, bankers and oil drillers from Texas and Louisiana, schoolteachers from Massachusetts and any number of college students. There were men who had never flown a plane out of sight of their home airport and men who had flown the Atlantic when that was a real job of flying. Moreover, they were all alive and well. Not one fatal accident had taken place and only a few planes had been delayed by minor troubles, despite the fact that





This ship, and to a lesser extent the Sikorsky S 42, promises the same kind of revolution in ocean flying that the Douglas DC-2 (Fortune, May, 1935) brought about in land flying. When Pan American asked for it in 1931 it was considered an impossibility. Its appearance on the Pacific in 1935 brought to a point six years of negotiating for ocean trade routes

Special new cowling flaps which have now successfully solved the problem of cooling a double-row engine such as those used here. When opened they increase the suction action of the cowl.

The four engines are double-row Wasps rated 900 horsepower at the take-off. The total of 3,600 horsepower is about equal to the power of a big railroad locomotive.

Martin Ocean Transport—Model 130

THE revolutionary fact about the Martin is that more than half of its gross weight of 51,000 pounds is useful load, instead of about a third, which has hitherto been the limit. In flying across an ocean useful load is the decisive factor, not only because vast quantities of fuel must be carried, but also because the requisite equipment is more elaborate than the equipment of land planes. The Martin carries such things as an anchor and winch, lifeboats and belts, boat hook, bilge pump, and ropes, besides all the regular aeronautical equipment such as two radios, fire extinguishers, flares, and flying instruments. In addition there is a galley complete with icebox, grill, sink, and dishes.

The basic weight of the ship when empty is about 24,200 pounds. Fitted out as a sixteen-passenger sleeper the equipment just referred to totals about 3,165 pounds. Add to this 1,400 pounds for 200 gallons of oil and add another 1,400 pounds for a crew of seven. This gives a total weight of about 30,000 pounds for the ship and equipment before so much as taking off. There are left about 21,000 pounds for fuel and pay load.

Theoretically the Martin can stow away about 4,000 gallons of gasoline, which, at a gallon a mile in still air, using about 75 per cent of horsepower, would give a range of 4,000 miles. But in order to carry so much fuel the ship would have to be stripped since this alone would weigh 24,000 pounds. Actually the Clippers cruise on only about 50 per cent of horsepower. At this output the engines would consume only 2,000 gallons on the 2,400-mile hop to Honolulu, but in allowing for thirty-mile head winds Pan American carries at least 2,600. Assuming that this figure will still stand after the present experimental period, the fuel weight would be 15,600 pounds, leaving 5,400 pounds for passengers, baggage, mail, and express. By U.S. contract at least 800 pounds have to be reserved for mail, leaving 4,600 pounds, which is the equivalent of eighteen passengers with baggage (and 1,000 pounds of express). On a shorter hop less gas would be loaded, more passengers. From Honolulu to Midway for example, which is 1,380 miles, as many as thirty passengers might be carried. Thus some passengers will have to go as far as Honolulu by boat and pick up the Clipper there.

The general specifications of the ship are:

Span, 130 feet
Length, 90.6 feet (larger than Columbus's *Pinta*)
Power loading, 15.3 pounds per horsepower
Wing loading, 22 pounds per square foot
Maximum speed, 180 miles per hour
Cruising speed, 150 miles per hour
Landing speed, 65 miles per hour (flaps are not used)

1. Anchor winch
2. Anchor
3. Ventilator shaft
4. Foghorn
5. Captain
6. First Officer
7. Radio Officer
8. Mail compartment
9. Luggage and express
10. Galley
11. Steward
12. Forward hatch
13. Passenger compartment
14. Flight Engineer
15. Life raft
16. Gas tanks
17. Fuel pump
18. Sea wing
19. Lounge
20. Footstool life preserver
21. Lavatory
22. Rear hatch and life raft
23. Watertight bulkhead door
24. Crew bunks
25. Water tank
26. Tail light
27. Radio D.F. mast
28. Fixed radio antenna
29. Anchor hatch
30. Center of gravity, horizontal range
31. Behind here the Navigator

It's there...but you can't see it

YOU NEVER SEE the element silicon in nature. Yet it's hidden everywhere—in sand, rocks, clays and soils, and even in amethyst and many other semiprecious stones. In fact, of all the elements, silicon is second only to oxygen in abundance.

Modern science has made silicon one of our most versatile and useful servants, but at the same time has followed nature's pattern of keeping it out of sight.

You can't see the silicon in metals, but steel is stronger and more uniform when it contains small amounts of silicon. Larger amounts of silicon are added to steel used in generators and transformers, and in motors that bring the magic of electricity into our homes. Silicon adds to the usefulness of aluminum in many important applications.

For many years, the people of Union Carbide have been extracting silicon from its hiding places in nature for use in metal-making. And now they are working with silicon's exciting chemical offspring—silicones, used for everything from improved furniture polishes to new rubber-like products.

FREE: *Learn how Union Carbide products and research help satisfy basic human needs. Write for "Products and Processes" booklet XG.*

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BAKELITE, VINYLITE, and KRENE Plastics
EVEREADY Flashlights and Batteries
PRESTONE Anti-Freeze
NATIONAL Carbons
HAYNES STELLITE Alloys
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LINDE Oxygen
PYROFAX Gas

Wanted: *More Green Thumbs*

In a world faced with constant food shortages in so many countries, more "green thumbs" are needed!

Here in America, modern agricultural methods have increased farm production 60% in the past generation even though today there are 20% fewer workers on the farms. This increased yield means plenty of food for every one here—and more besides. And the same methods, applied in other countries, would help answer world food needs.

Better seed, fertilizer, and new scientific methods play their part. Equally important are the various chemicals that now fight off blight, disease, and destructive insects. Starting before planting and continuing until the food is ready for our tables, hundreds of new materials increase and protect our food supply.

Even after harvest, man-made agents speed the ripening process. Others guard our food against rodents and insects.

The people of Union Carbide help make possible the high productivity of America's food producers by supplying chemicals for fungicides and insecticides, gases for ripening and preserving, and the stainless steel so important in the preparation and distribution of food. If you have a materials problem, in this field or other fields, it is quite likely they can help you also.

FREE: *Learn more about the interesting things you use every day Write for the illustrated booklet "Products and Processes" which tells how science and industry use Union Carbide's Alloys, Chemicals, Carbons, Gases, and Plastics in creating things for you. Write for free booklet B.*

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Synthetic Organic Chemicals • Linde Gases • Bakelite, Krene, and Vinylite Plastics
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Guarding against Nature

New and improved materials are reducing the toll you pay to sun, wind, and rain

NATURE'S not always friendly, for we must pay, directly or indirectly, the cost of damage to our homes, our cars, and other possessions by wind, water, and the heat of the sun.

OUT OF OUR POCKETS—Losses to the elements, through rust, decay, and evaporation, today cost the average American family about $250 a year.

Industry's scientists are making constant progress in combatting these losses. Your window screens and car trim, alike, now remain rust-free and bright, when made of stainless steel.

NEW CHEMICALS and resins are the basis of versatile plastics, and give added life and brilliance to paint for your home. They also protect your car and even the hulls of ships. Recently-developed silicone water-repellents protect the masonry walls of our buildings by letting moisture out, but not in.

HOW UCC HELPS—Providing industry with a steadily-increasing variety of materials that resist the harmful effects of the elements is one of the important jobs of the people of Union Carbide.

FREE: *Learn how* ALLOYS, CARBONS, GASES, CHEMICALS, *and* PLASTICS *improve many things that you use. Ask for "Products and Processes" booklet XF.*

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HAYNES STELLITE Alloys
LINDE Silicones
PRESTONE Anti-Freeze
NATIONAL Carbons
ACHESON Electrodes
EVEREADY Flashlights and Batteries
BAKELITE, VINYLITE, and KRENE Plastics
SYNTHETIC ORGANIC CHEMICALS
PREST-O-LITE Acetylene
LINDE Oxygen

Safety Rules

Never touch a switch with wet or damp hands.

Never overload your connections.

Never poke around a radio or television set if the switch is on.

Never pull the chain of a light bulb if you are standing on a wet floor.

Never, never touch a broken cable after or during a storm, or even if the sun is shining. Call a policeman or a fireman.

Never touch an electrical appliance, switch, radio, or television set while bathing or when wet.

Never put electrical wires under carpets.

Never put a penny in the fuse box. Use a fuse of the proper size.

Never place anything except an electrical plug into a wall socket.

Never remain in a lake during a thunderstorm.

Never remain under or near a tree during an electrical storm or a thunderstorm. Find other shelter quickly.

The
HOW
AND
WHY
Wonder Book of

CHEMISTRY

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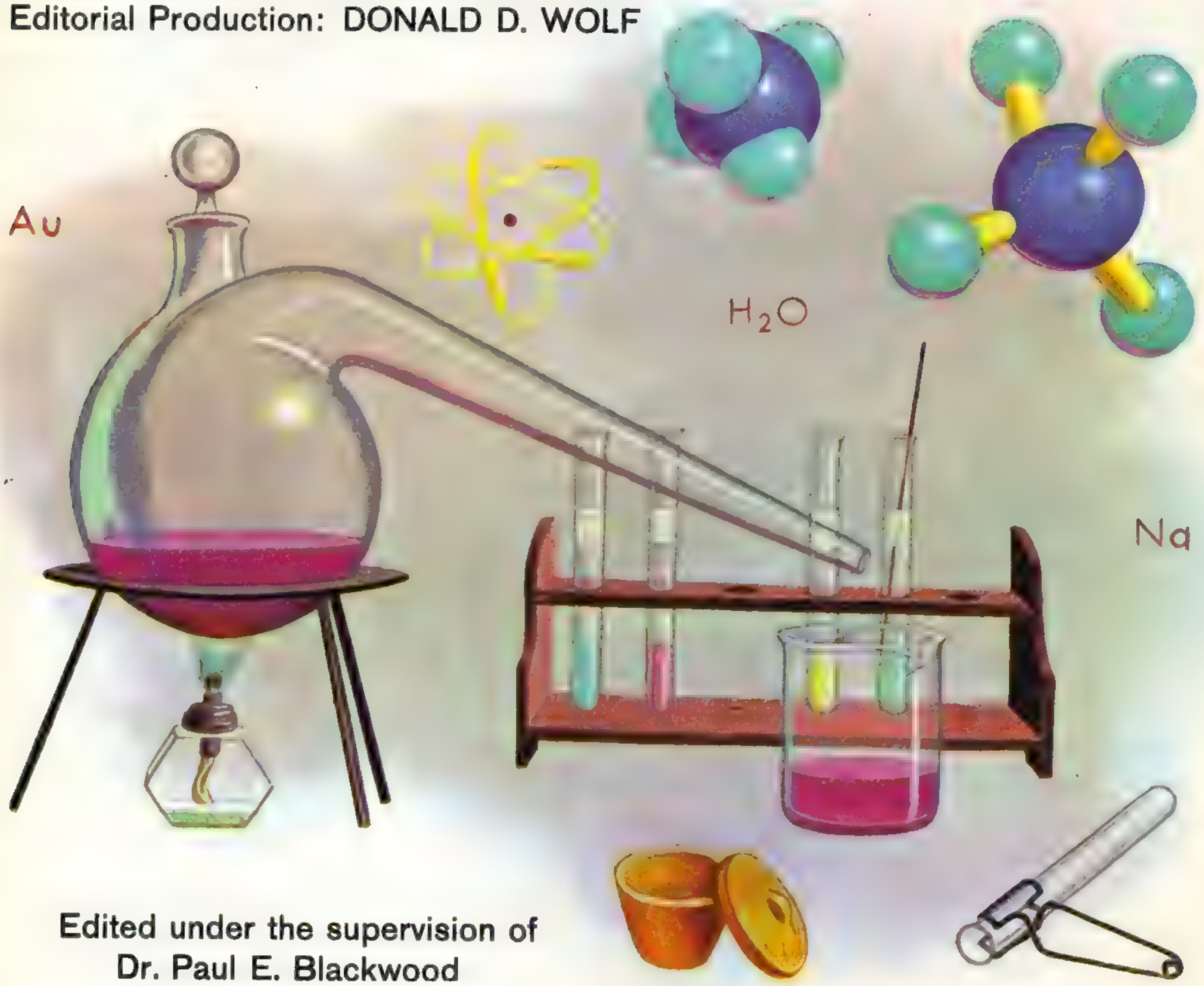
12

How and Why Wonder Books

THE HOW AND WHY WONDER BOOK OF
CHEMISTRY

Written by MARTIN L. KEEN
Illustrated by WALTER FERGUSON
Cover Illustration by DONALD CROWLEY
Editorial Production: DONALD D. WOLF



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Text and illustrations approved by
Oakes A. White, Brooklyn Children's Museum, Brooklyn, New York

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BUSINESS
FOOD
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MRS

EVIL
SCIENTIST

PROCTER & GAMBLE, big name in soaps, had a problem in unloading semi-solid caustic from tank cars. A Shell Industrial Lubricant solved the problem.

SUPER-HEATED BUBBLE BATH!

One of soap's basic raw materials comes to Procter & Gamble plants by tank car—in a semi-solid form. It must be liquefied for removal.

Usually jobs of this sort can be done by running hot water through coils in the car. But in P&G's case, higher temperatures were needed—hotter than water or low-pressure steam would allow. Oil seemed the logical heat transfer medium until it was found that some oils formed sludge and clogged the tank-car coils.

Shell engineers, given this problem, made a study and recommended Shell Vitrea Oil. This product of Shell Research is so highly refined that no sludge-forming components remain. It not only speeds the unloading job, but its non-sludging qualities have saved hundreds of man-hours once wasted in cleaning clogged coils.

Development of better lubricants is only one way in which Shell demonstrates leadership in the petroleum industry, and in petroleum products. Wherever you see the Shell name and trade mark, Shell Research is your guarantee of quality.

SHELL

Shell Research leads
to Better Products—
more for your money

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The
**HOW
AND
WHY**
Wonder Book of

LIGHT AND COLOR

[illegible] 50¢

How and Why Wonder Books

STYRON (DOW POLYSTYRENE)

IF YOUR eye were looking through the crystal-clear cube, you would see the fascinating future of a remarkable plastic development. This cube is STYRON*—Dow's tradename for polystyrene which it pioneered and produces.

STYRON is a highly efficient electrical insulator and is resistant to alcohol, acids and alkalies. Precision moldings from this material have high dimensional stability. STYRON is but one of several Dow plastics—all possessing endless possibilities for new and useful applications when peace returns.

Behind STYRON is the water-white liquid—styrene—an essential ingredient of synthetic rubber and one of Dow's great contributions to Victory.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN
New York • St. Louis • Chicago • San Francisco • Los Angeles • Seattle • Houston

DOW

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TO INDUSTRY AND VICTORY

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The HOW AND WHY Wonder Book of
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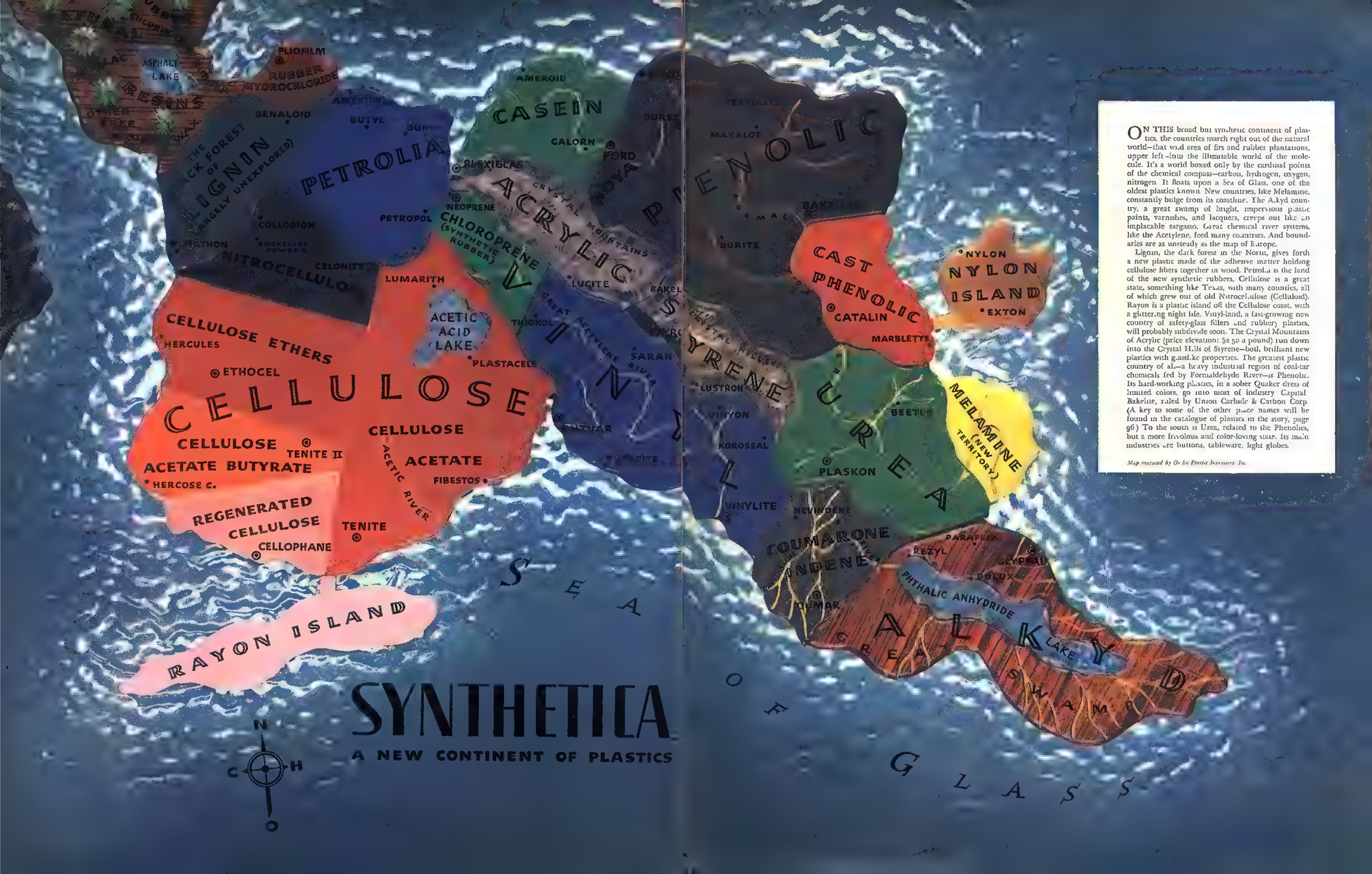


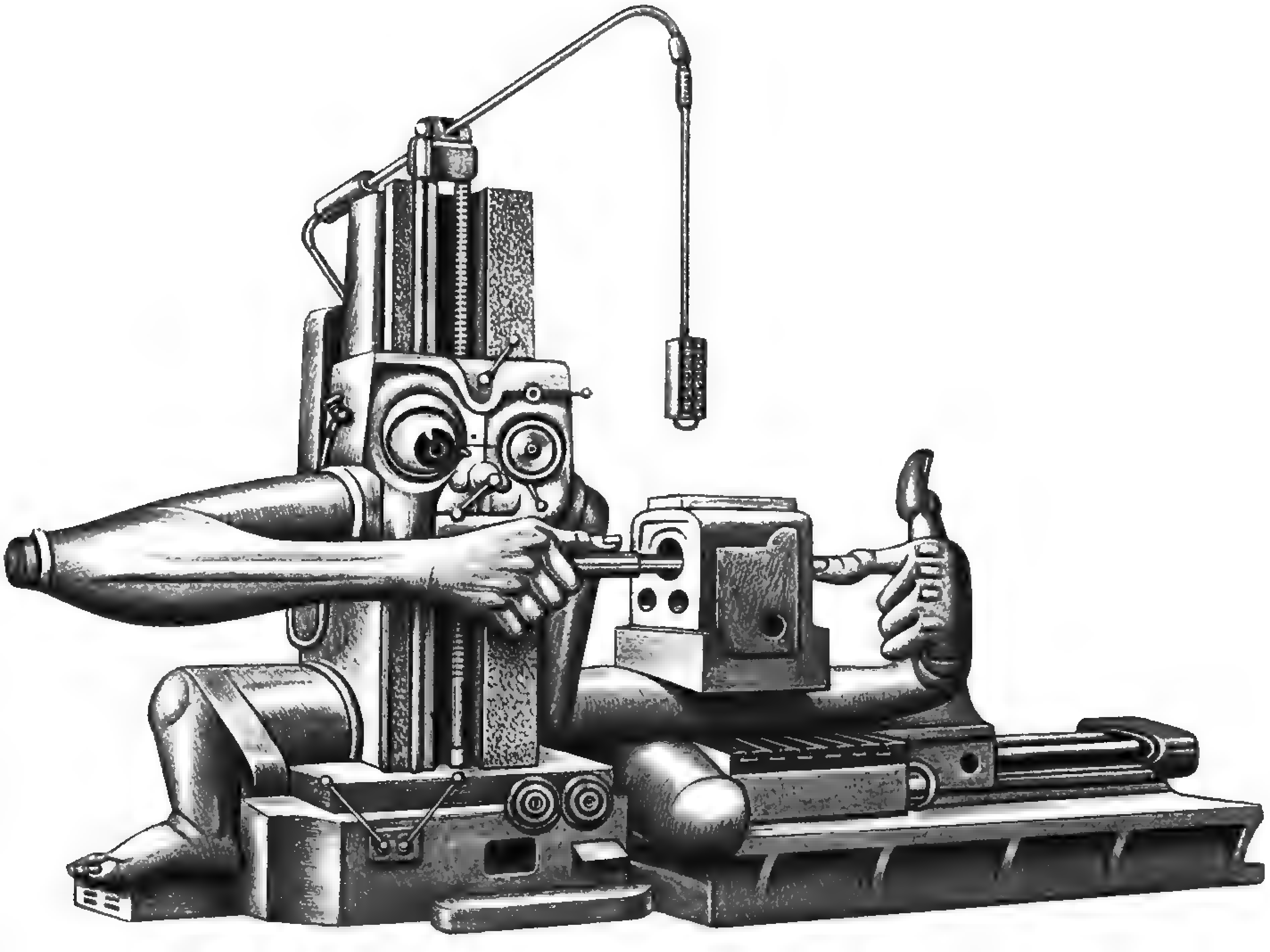
SYNTHETICA

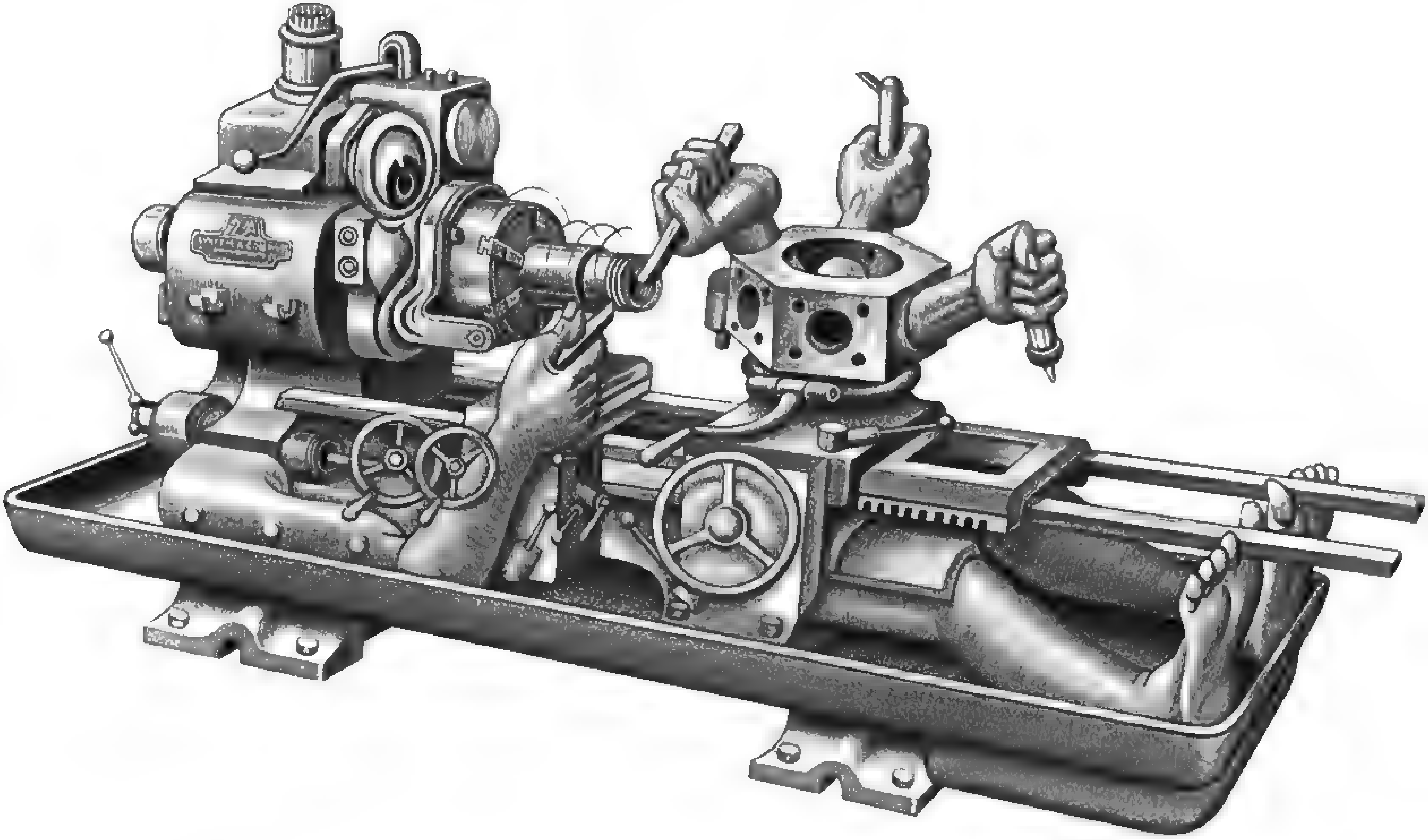
A NEW CONTINENT OF PLASTICS

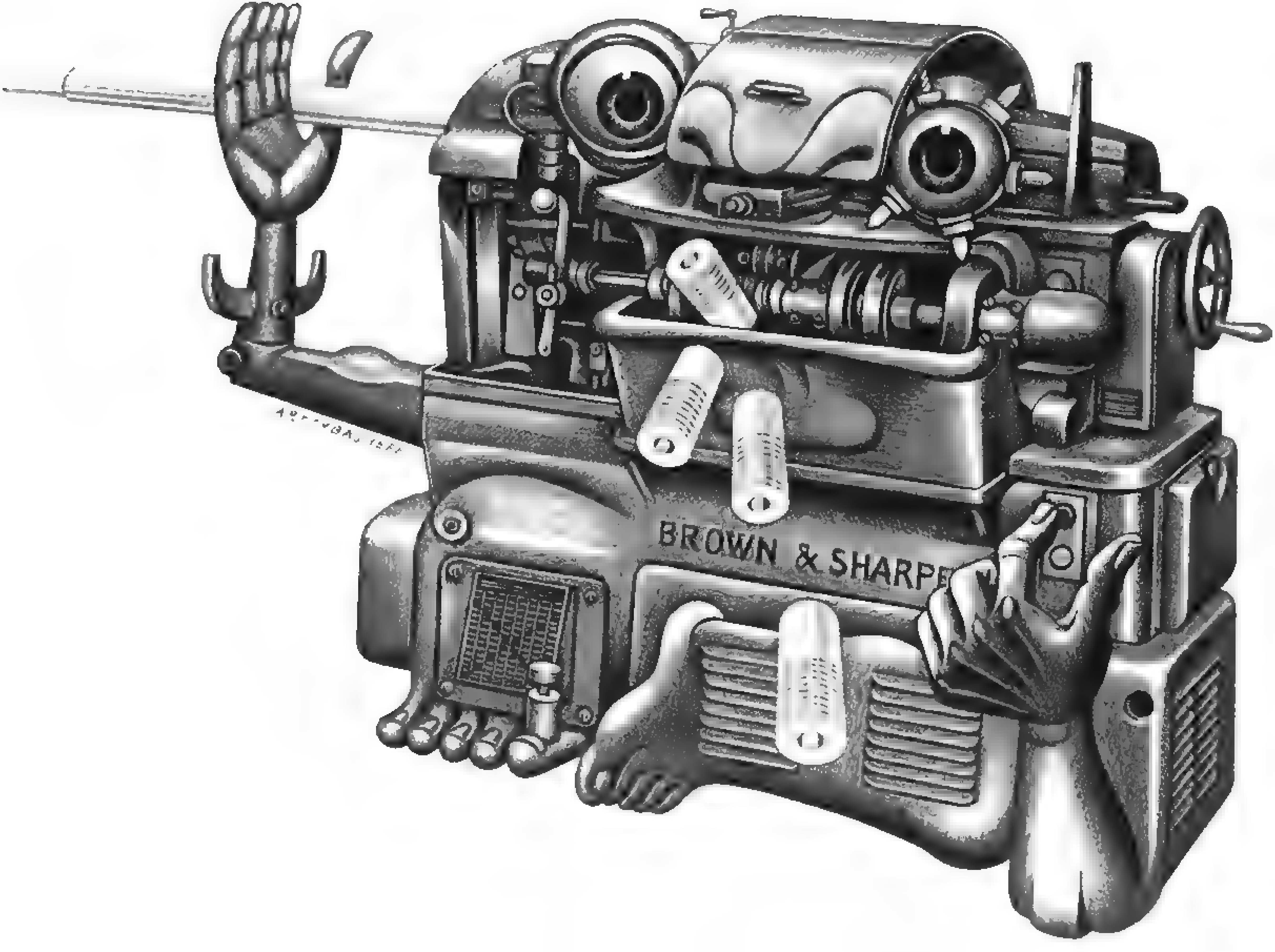
ON THIS broad but synthetic continent of plastics, the countries march right out of the natural world—that wild area of firs and rubber plantations, upper left—into the illimitable world of the molecule. It's a world boxed only by the cardinal points of the chemical compass—carbon, hydrogen, oxygen, nitrogen. It floats upon a Sea of Glass, one of the oldest plastics known. New countries, like Melamine, constantly bulge from its coastline. The Alkyd country, a great swamp of bright, impervious plastic paints, varnishes, and lacquers, creeps out like an implacable sargasso. Great chemical river systems, like the Acetylene, feed many countries. And boundaries are as unsteady as the map of Europe.

Lignin, the dark forest in the North, gives forth a new plastic made of the adhesive matter holding cellulose fibers together in wood. Petrolia is the land of the new synthetic rubbers. Cellulose is a great state, something like Texas, with many counties, all of which grew out of old Nitrocellulose (Celluloid). Rayon is a plastic island off the Cellulose coast, with a glittering night life. Vinyl-land, a fast-growing new country of safety-glass fillers and rubbery plastics, will probably subdivide soon. The Crystal Mountains of Acrylic (price elevation: $2.50 a pound) run down into the Crystal Hills of Styrene—both brilliant new plastics with glasslike properties. The greatest plastic country of all—a heavy industrial region of coal-tar chemicals fed by Formaldehyde River—is Phenolic. Its hard-working plastics, in a sober Quaker dress of limited colors, go into most of industry. Capital Bakelite, ruled by Union Carbide & Carbon Corp. (A key to some of the other place names will be found in the catalogue of plastics in the story, page 96.) To the south is Urea, related to the Phenolics, but a more frivolous and color-loving state. Its main industries are buttons, tableware, light globes.

Map executed by Ortho Plastic Novelties, Inc.



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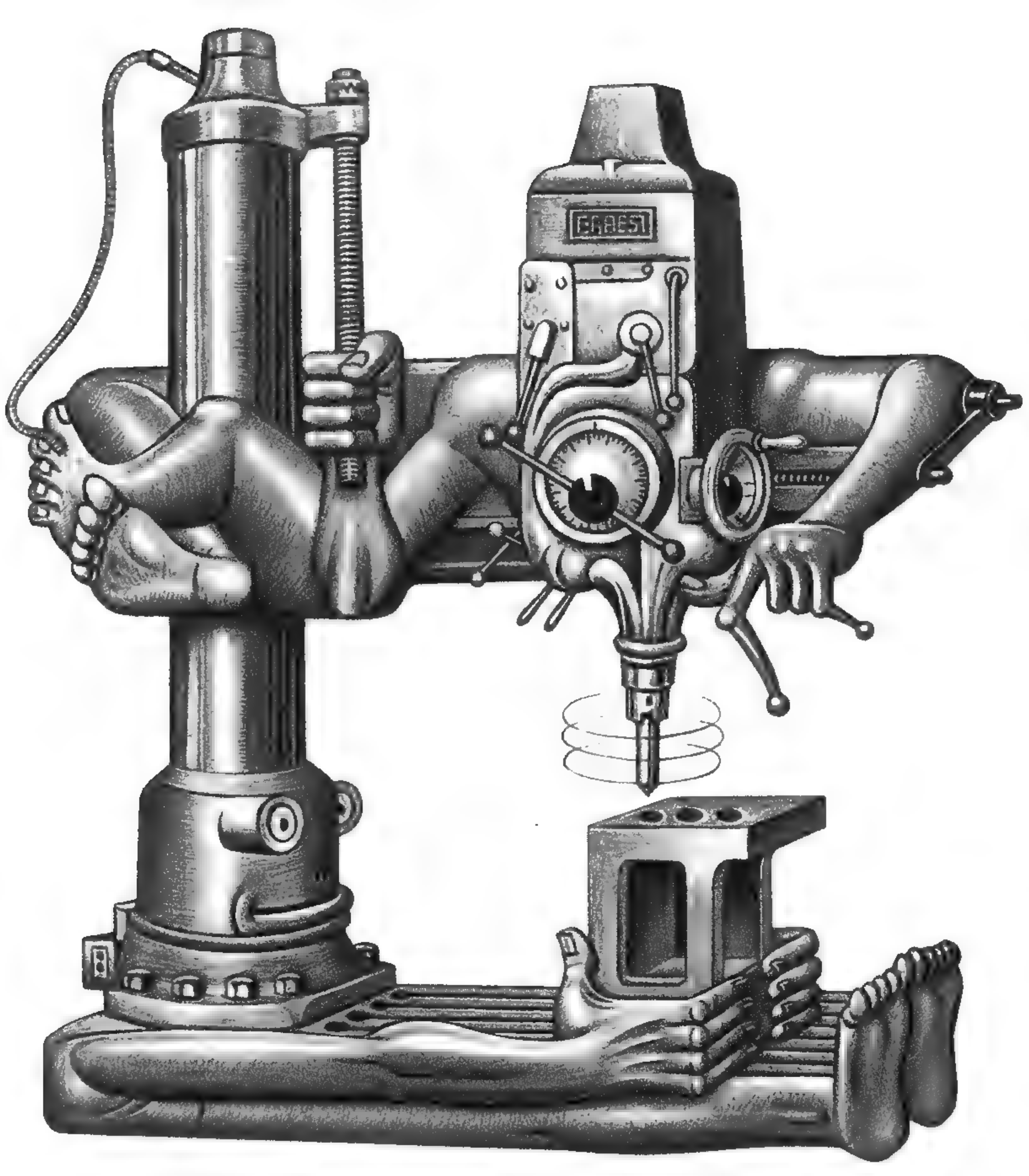
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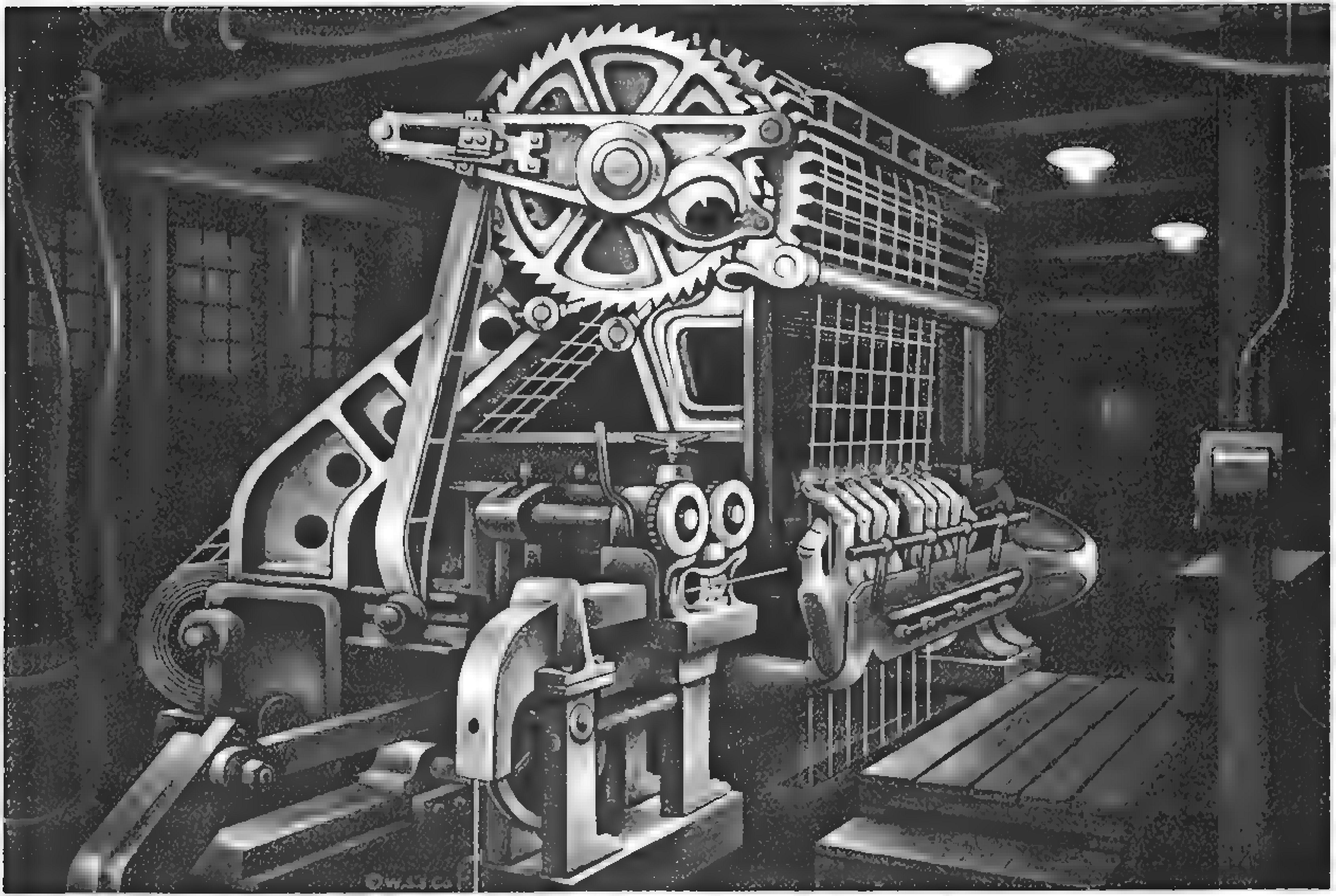
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Skyrocketing!

Up go the sales of the new Bright Star flashlight with lens, case and switch control of Monsanto Plastics.

These modern plastic materials have helped create a whole *new* market for flashlights. Adaptability of Monsanto molding compounds to rapid production has enabled the Bright Star Battery Company to *double* its output quickly, thus enjoying the benefits of the nation-wide demand created in an amazingly short time.

Monsanto Plastics have given these new flashlights through-and-through color in a dozen attractive shades; have made them pleasantly warm to the touch; have made it easy to mold them in new streamlined contours. More—Monsanto Plastics provide a tough, durable case molded in one piece. The shatterproof lens and rim are molded complete with threads.

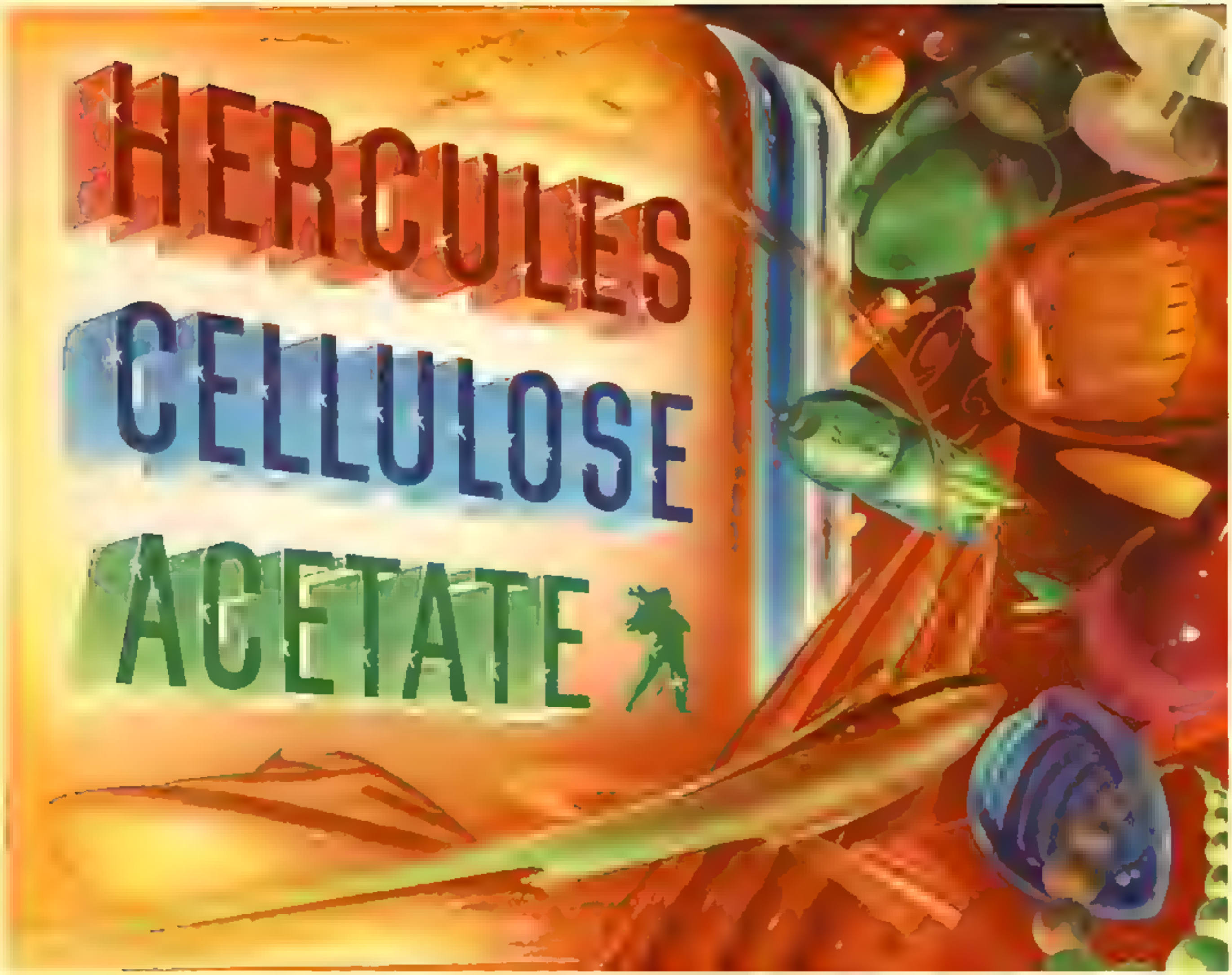
Your product may be ready for a similar transformation in which Monsanto Plastics can make an equally important contribution. For information and names of fabricators, inquire: Monsanto Chemical Company, Plastics Division, Springfield, Massachusetts. District Offices: New York, Chicago, Detroit, St. Louis, Los Angeles, Montreal.

MONSANTO PLASTICS
Cellulose Acetate • Cellulose Nitrate
Cast Phenolic Resin • Polyvinyl Acetals

Sheets • Rods • Tubes
Molding Compounds • Castings
Vue-Pak Transparent Packaging Materials

MONSANTO PLASTICS

PRODUCTS OF MONSANTO CHEMICAL COMPANY



It's 8 a. m. tomorrow in plastics

Today scores of manufacturers are stepping ahead of competition with the help of new, laboratory created materials that have no counterpart in the animal, mineral or vegetable world. One of these is cellulose acetate which combines amazing strength and toughness with eye startling beauty. Already it is used for thousands of things from steering wheels to transparent boxes, from electrical parts to door knobs, and from oil cans to jewelry. Progress is so rapid that daily the skill of molding experts brings new applications into use

In the forefront of plastics are those formed with Hercules cellulose acetate as a base . . . light and beautiful . . . with a tough, chain like molecular structure . . . easily and automatically molded

For years Hercules Powder Company has been one of the world's largest producers of cellulose derivatives, and a leader in cellulose chemistry Hercules manufacturing experience, and the research of scientists in the Hercules Experiment Station, have brought advanced processes and controls that now help to make possible things that "couldn't be done" just a short time ago That is why leading makers of plastic molding compounds use Hercules cellulose acetate The ever advancing contributions of Hercules research and skill are reflected in superior finished products.

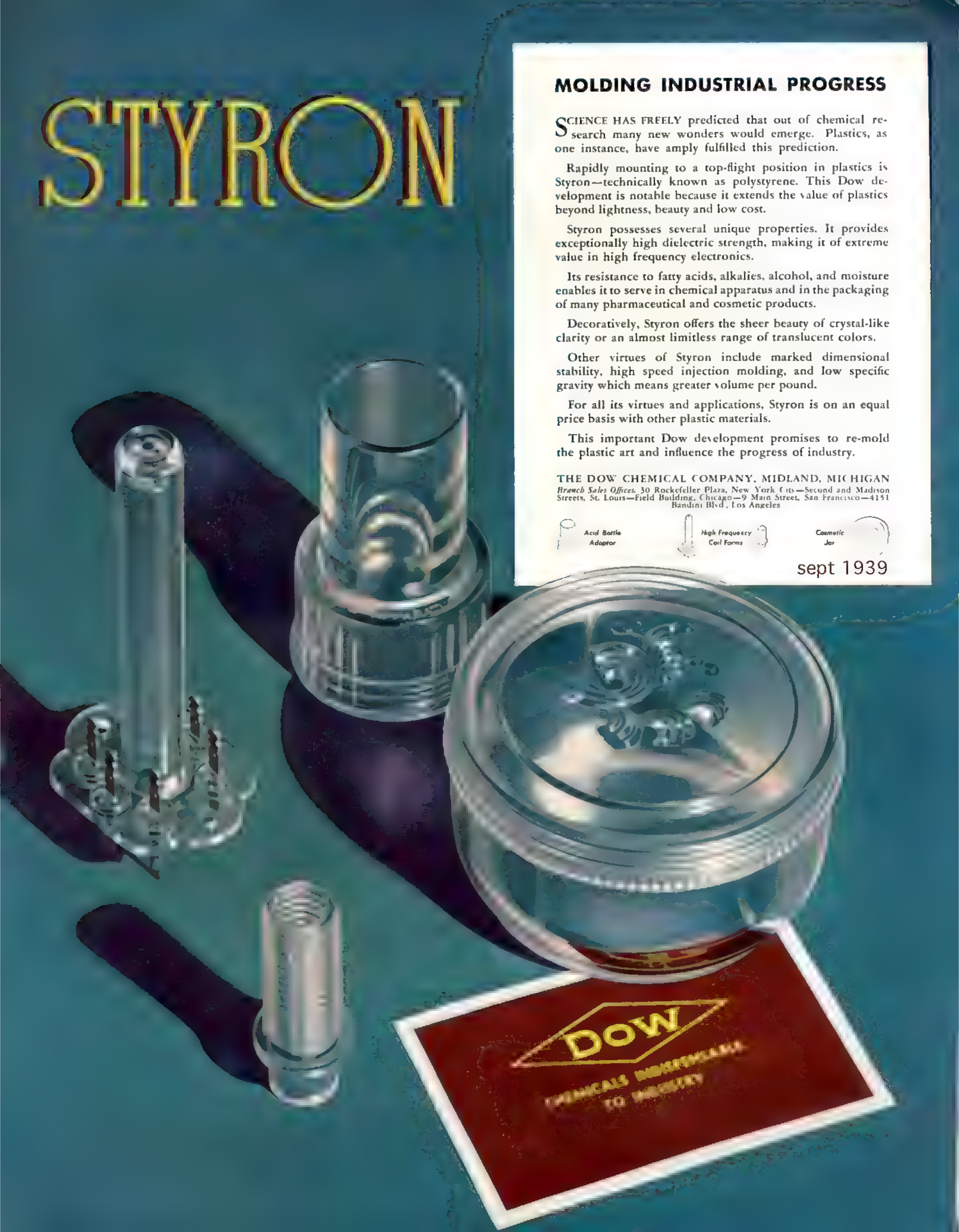
Cellulose Products Department

HERCULES POWDER COMPANY

WILMINGTON DELAWARE

CELLULOSE ACETATE • NITROCELLULOSE • ETHYL CELLULOSE • CHLORINATED RUBBER

Familiar to chemists and physicists is the long, complex, chain like molecule which gives cellulose plastics their outstanding toughness . . . combined with lightness and beauty



MOLDING INDUSTRIAL PROGRESS

SCIENCE HAS FREELY predicted that out of chemical research many new wonders would emerge. Plastics, as one instance, have amply fulfilled this prediction.

Rapidly mounting to a top-flight position in plastics is Styron—technically known as polystyrene. This Dow development is notable because it extends the value of plastics beyond lightness, beauty and low cost.

Styron possesses several unique properties. It provides exceptionally high dielectric strength, making it of extreme value in high frequency electronics.

Its resistance to fatty acids, alkalies, alcohol, and moisture enables it to serve in chemical apparatus and in the packaging of many pharmaceutical and cosmetic products.

Decoratively, Styron offers the sheer beauty of crystal-like clarity or an almost limitless range of translucent colors.

Other virtues of Styron include marked dimensional stability, high speed injection molding, and low specific gravity which means greater volume per pound.

For all its virtues and applications, Styron is on an equal price basis with other plastic materials.

This important Dow development promises to re-mold the plastic art and influence the progress of industry.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN
Branch Sales Offices. 30 Rockefeller Plaza, New York City—Second and Madison Streets, St. Louis—Field Building, Chicago—9 Main Street, San Francisco—4151 Bandini Blvd., Los Angeles

sept 1939

Anaconda Wire & Cable Company cut lubricant inventories at one plant by two-thirds when they started using multi-purpose oils and greases developed by Shell.

Drawing made easy

To make the springs that snap in mousetraps, the filaments that glow in lamps, the cables that suspend bridges or carry electricity, you start with metal rods and pull or "draw" out wire.

At the Anaconda Wire & Cable Company plant in Muskegon, Michigan, this operation was being slowed by complex maintenance problems. To service their machines, they were using 24 different oils and greases. So they asked Shell to help formulate a more efficient lubrication plan.

Shell engineers analyzed the requirements of every machine. They found places where one Shell lubricant could do the job of several products then in use—and do it better. As a result of this study, Anaconda was able to reduce inventories to six oils and a grease, and save time, storage space, money.

Inventiveness and dependability are among the reasons industry turns so often to Shell. This is why you, too, can be sure of better products, more for your money, wherever you buy under the Shell name and trademark.

Leaders in Industry rely on Shell Industrial Products

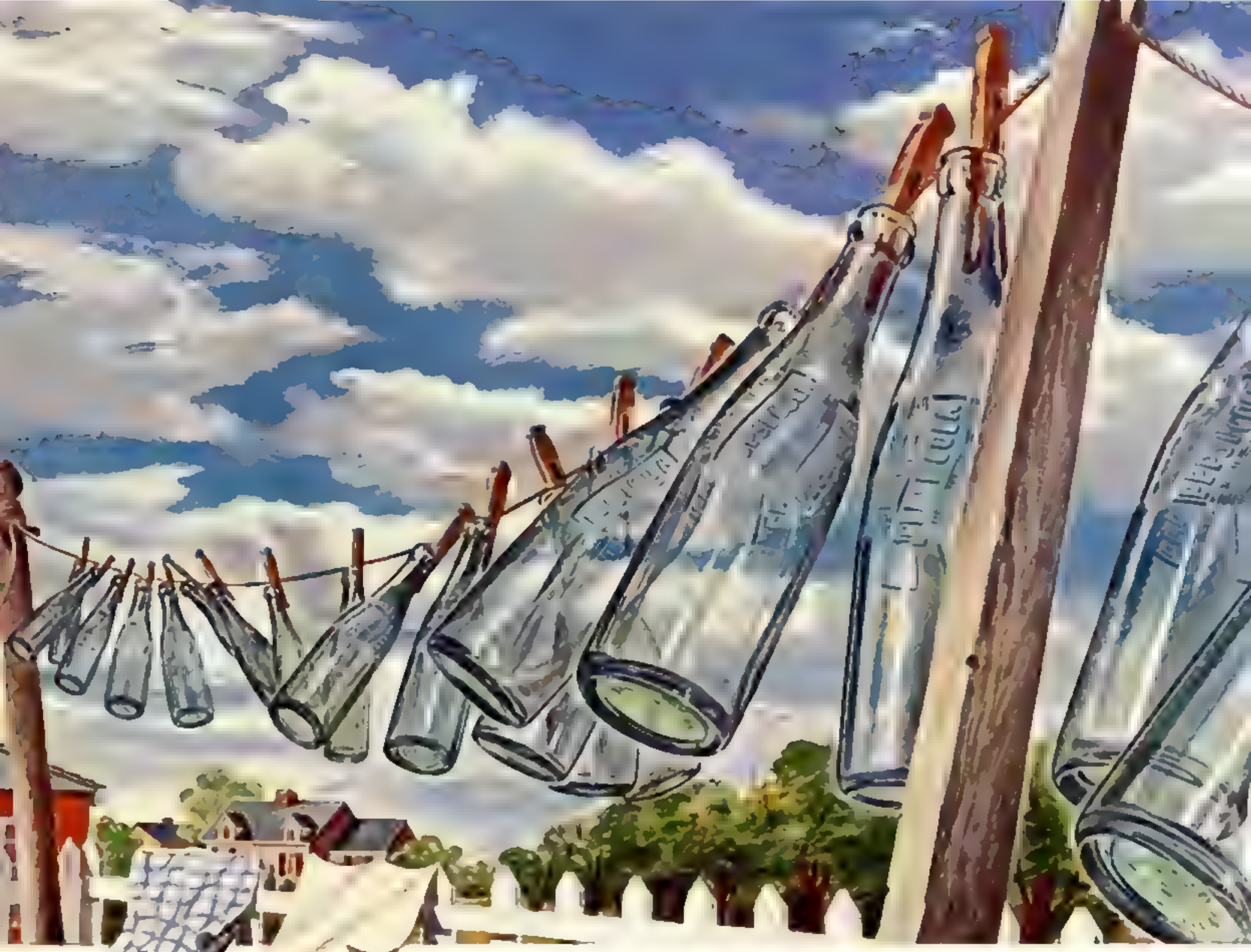
© 1958, SHELL OIL COMPANY

SHELL

Men Who Plan beyond Tomorrow Like the Lightness of Seagram's V.O.

The house of the future, turning automatically to face the sun all day long—so healthful rays may stream through special ultra-violet windows into spacious rooms. The amphibious car, for land or water. . . and the family plane—a flying wing. All these are being developed now by Men Who Plan Beyond Tomorrow!

* * *



PEPSI-COLA COMPANY solved a serious problem in its equipment for bottle-washing and sterilizing by changing to a Shell Industrial Lubricant.

No "Blue Washdays" at Pepsi-Cola

At PEPSI-COLA, modern equipment operates continuously – washing and sterilizing tens of thousands of bottles an hour.

Requirements for the lubricant used on the chains and cams of these machines are unusually severe. Excessive moisture and heat caused by steam in the plant – plus the proximity of strong solutions – will wash off ordinary lubricants.

Because of their exacting requirements for cleanliness, Pepsi-Cola technicians searched for a lubricant which would not wash off under these severe conditions and impair efficient operation of the machines.

Shell Lubrication Engineers were called in. They recommended Shell Cardium Compound SR – a high quality Shell Industrial Lubricant designed to retain its stability under just such conditions. **Result: A continuous stream of sparkling clean bottles.**

Under the steady advances in machines and industrial methods, advances in lubrication become more important. Yesterday's solution is seldom good enough for today! At Shell's research laboratories lubricants are constantly being improved. Shell Lubrication Engineers apply these improvements in the field.

• • •

Make sure the machines in your plant get the benefit of all that's new in lubrication. Call the Shell Lubrication Engineer.

LEADERS IN INDUSTRY RELY ON

SHELL INDUSTRIAL LUBRICANTS

SHELL

SIGHTSEEING WITH BAKELITE

Furniture Industry

FEW PEOPLE realize how extensively Bakelite Materials are now employed in the design and fabrication of both period and modern furnishings.

The well-made furniture of today...for homes, for offices, and for commercial rooms and buildings . . . very often is more original in design, more handsomely finished, or more durable under varied conditions of service and abuse, because it is made with one or more of these materials.

The illustrations indicate some of the many types of service, and uses in furniture manufacture, for which Bakelite Materials provide outstanding advantages.

LIVING-ROOM *tables and chairs of period or modern patterns acquire new beauty, and depth and durability of finish from Bakelite resin varnishes. Translucent lampshades and heat-proof radiator covers are made from Bakelite Laminated.*

DINING ROOM *suites of modern design often are fini. throughout with Bakelite Laminated. Table tops, chair ar and sideboard surfaces made from this permanently lustro material are indifferent to heat and moisture.*

BOUDOIR *and other furniture, constructed from plywoods and veneers bonded with Bakelite Plybond, is protected against delamination. This modern wood adhesive is highly resistant to heat, humidity, water and staining.*

OUTDOOR *furniture made with Bakelite Materials, retains its beauty after long exposure to sun and rain. Wood and metal parts are finished with Bakelite resin enamels; upholstery, with Revolite, a Bakelite resinoid processed fabric.*

OFFICE *furnishings gain distinction, and structural du bility, from Bakelite Laminated desk tops, Bakelite Mol. corner buffers, Bakelite cast resinoid drawer handles, Re lite upholstery, and Bakelite resin varnish for wood surfac.*

RESTAURANTS AND BARS *in increasing numbers are employing furniture and wall-paneling of sturdy, colorful Bakelite Laminated. Table, counter and bar tops of this lustrous material withstand hot plates or liquids, smoldering cigarettes and alcoholic beverages.*

BEAUTY PARLORS *and other commercial shops and stores find important advantages in Bakelite Laminated for dressing table, desk and counter tops. It retains its smartness despite wear, constant handling and abuse. Store-fronts and booths also are advantageously made from this permanently lustrous material.*

EQUALLY valuable and diversified applicatio. of Bakelite Materials have been adoptec throughout practically every branch of modern industry. With Bakelite Molded, Laminated, Cast Resinoid, Plybond and other products, manufacturers are solving an increasing number and variety of problems in production, performance, appearance and saleability. Our engineers will be glad to discuss with you the advantageous possibilities of Bakelite Materials for your products.

Write for our illustrated booklets 27M, "Bakelite Molded"; 27L, "Bakelite Laminated"; and 27V, "Bakelite Varnish".

BAKELITE CORPORATION, 247 Park Avenue, New York, N.Y.
BAKELITE CORP. OF CANADA, LTD., 163 Dufferin St., Toronto, Ontario
West Coast: Electrical Specialty Co., Inc., 316 Eleventh Street, San Francisco, Cal.

BAKELITE

*Trade Mark Reg. U. S. Pat. Off

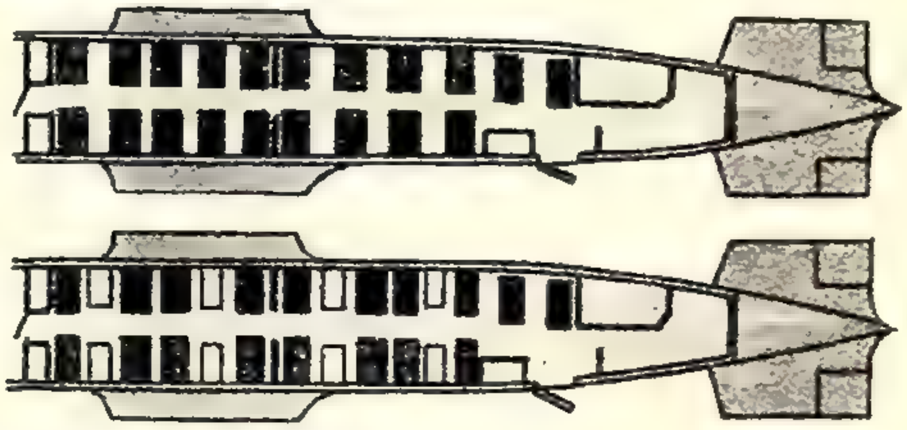
THE MATERIAL OF A THOUSAND USES

LIFE

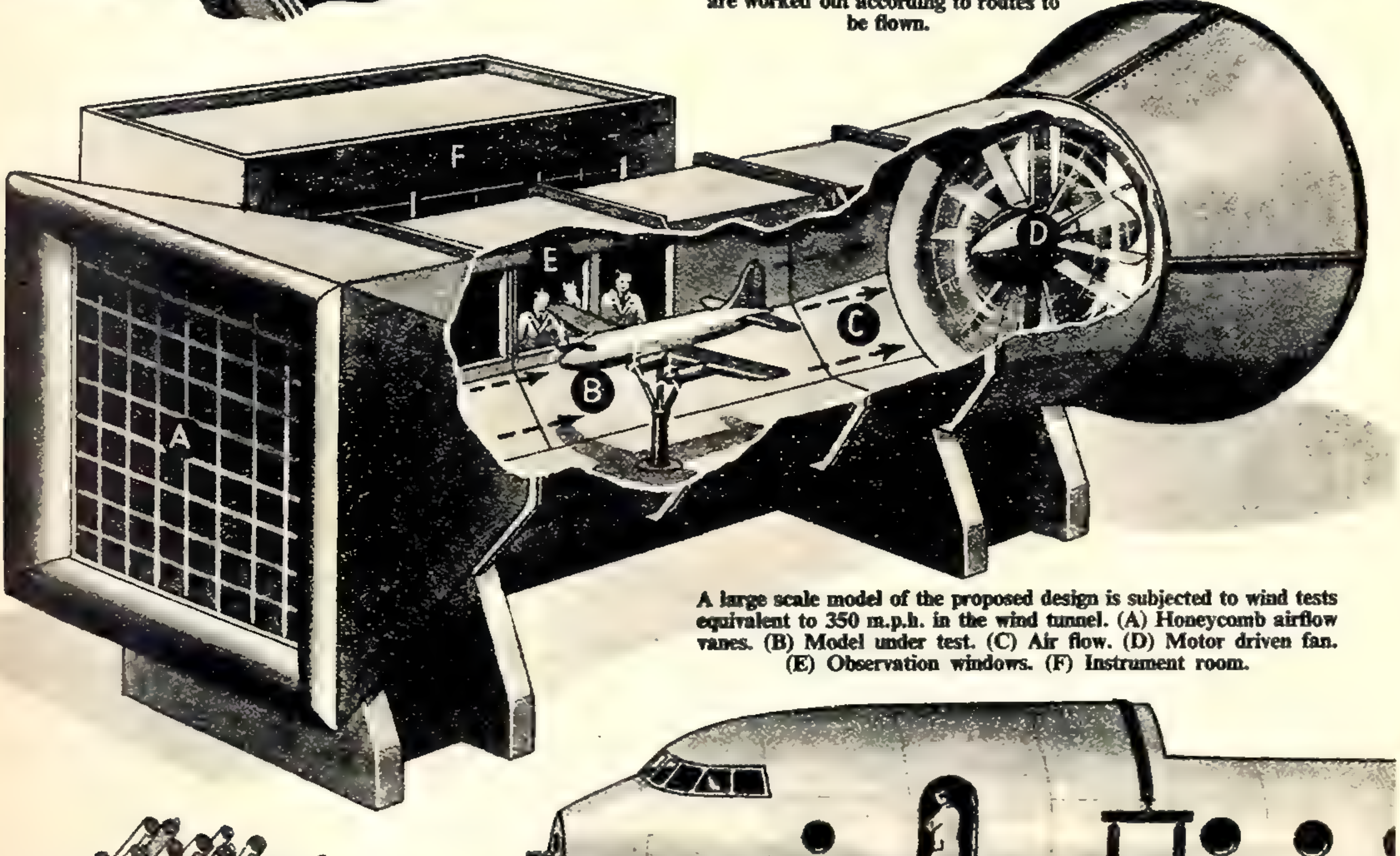
The birth of an AIR-LINER

DESCRIBED AND ILLUSTRATED BY L. ASHWELL WOOD

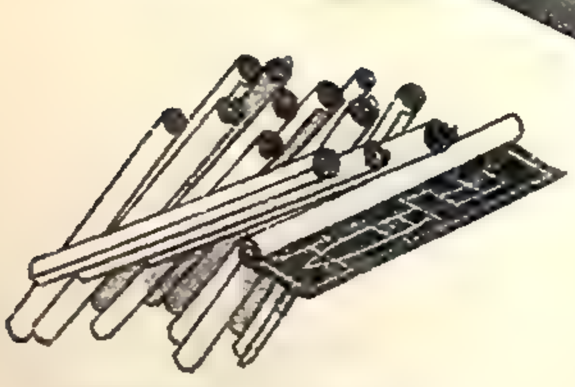
When special requirements are received, various models are made and studied at a design conference between senior designers, mathematicians, stress engineers and test pilots.



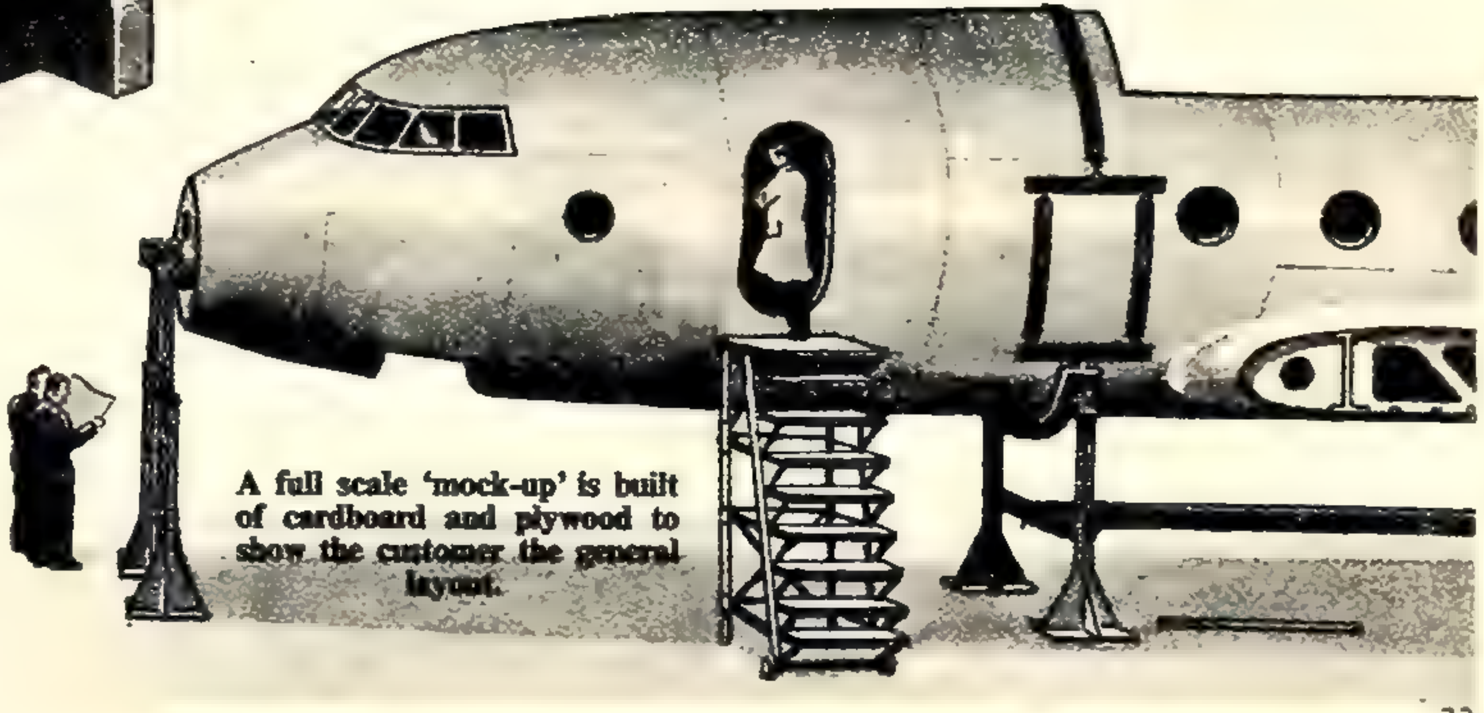
Alternative seating accommodations are worked out according to routes to be flown.



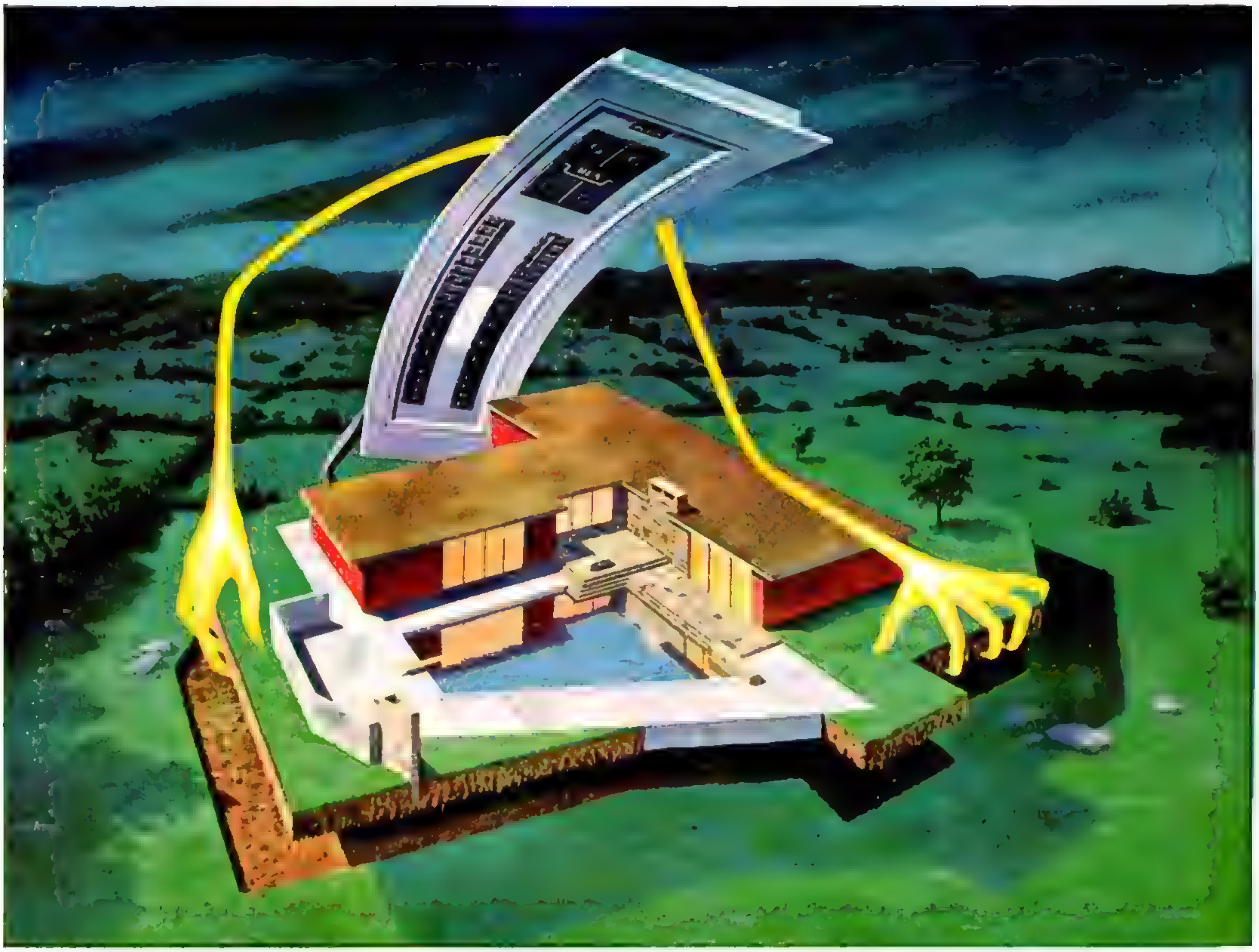
A large scale model of the proposed design is subjected to wind tests equivalent to 350 m.p.h. in the wind tunnel. (A) Honeycomb airflow vanes. (B) Model under test. (C) Air flow. (D) Motor driven fan. (E) Observation windows. (F) Instrument room.



Hundreds of drawings are prepared and blue prints made for the constructors.



A full scale 'mock-up' is built of cardboard and plywood to show the customer the general layout.



In more ways than one, today's home is literally in the hands of electricity. And as artist Ned Seidler visualizes, it needs the kind of protection the Walker panelboard offers.

ELECTRIC MUSCLES POWER THE MODERN HOME

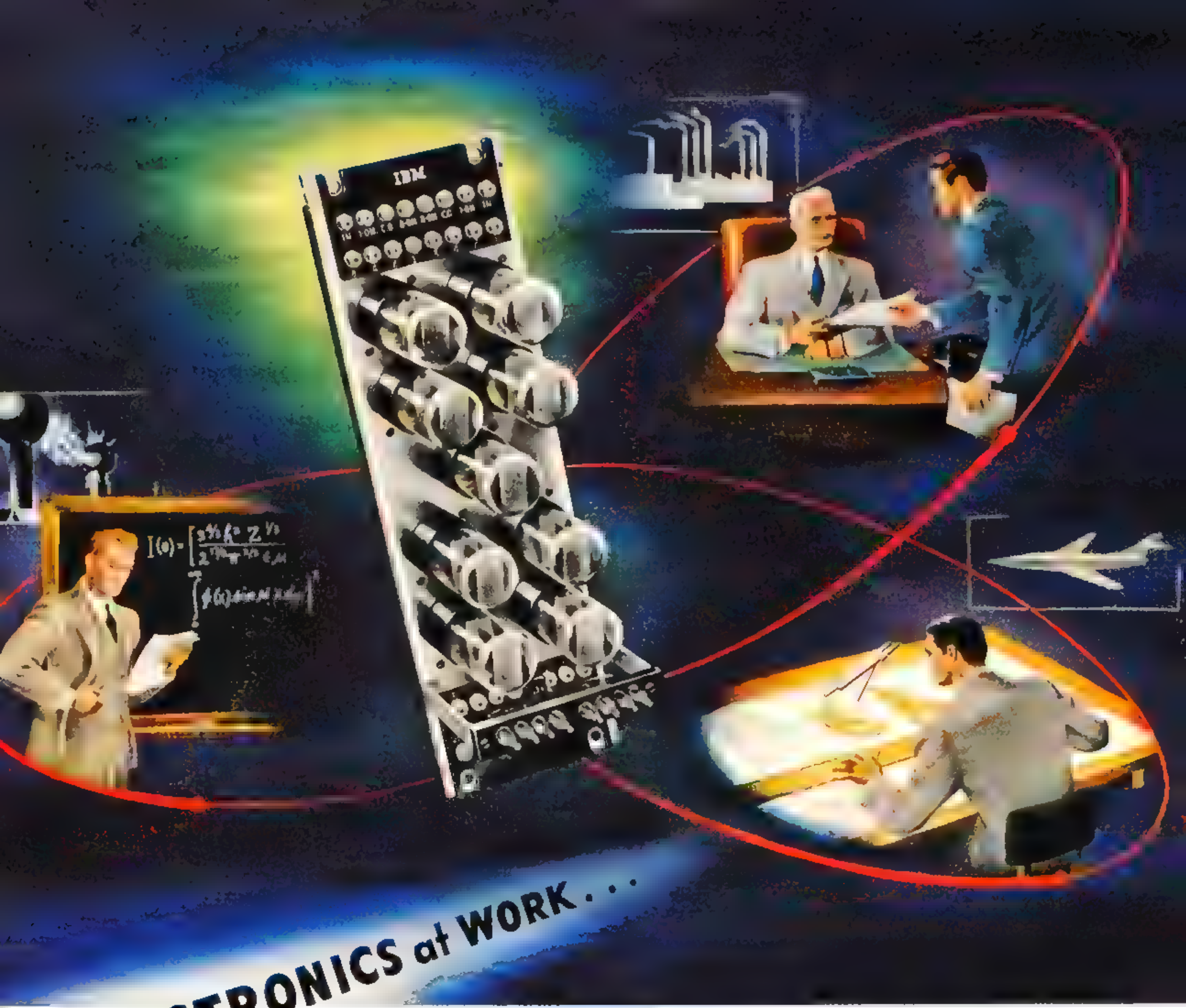
Remember when doing the laundry was an all-day, wife-killing chore? Remember when open windows were the only weapons against summer heat? Remember when your refrigerator was called an "icebox"? Remember when home was a place you had to go out of to have fun? Today we have the automatic washer and dryer . . . air conditioning . . . home freezers . . . television . . . and backyard swimming pools. Electricity provides the muscles for all of them. So you never want to lose your electricity, even for a little while. And I-T-E's subsidiary, Walker Electric Co., builds electric panelboards that protect your electric circuits. They use tiny I-T-E circuit breakers to open quickly in case of short circuits or overloads . . . prevent risk of fire. Then by simply flipping a toggle, you can bring your power back fast. In homes, factories, stores, schools, offices, even on ships at sea . . . in fact wherever electricity is used . . . you can find the products of I-T-E at work helping to make it more dependable and more efficient.

Divisions: Switchgear • Small Air Circuit Breaker • Transformer & Rectifier • Special Products • Greensburg • BullDog Electric Products • Victor Insulators • Kelman Power Circuit Breaker • Subsidiaries: The Chase-Shawmut Co. • Walker Electrical Co. • Wilson Electrical Equipment Co. • In Canada: BullDog Electric Products Co. Ltd. • Eastern Power Devices Ltd. • Canadian Porcelain Co. Ltd. • Headquarters: Philadelphia, Pa.

I-T-E CIRCUIT BREAKER COMPANY

09.60

ON



ELECTRONICS at WORK . . .

A BUSINESSMAN needs a report on his company's production and inventory position, and he has to have it faster than ever before.

A SCIENTIST, working in the atomic energy field, needs to know the exact effect of relativistic mass increases in the slowing down of fast electrons.

AN AIRCRAFT DESIGNER needs to determine the theoretical stresses and strains brought about by the use of new-type controls on a jet-powered, supersonic plane.

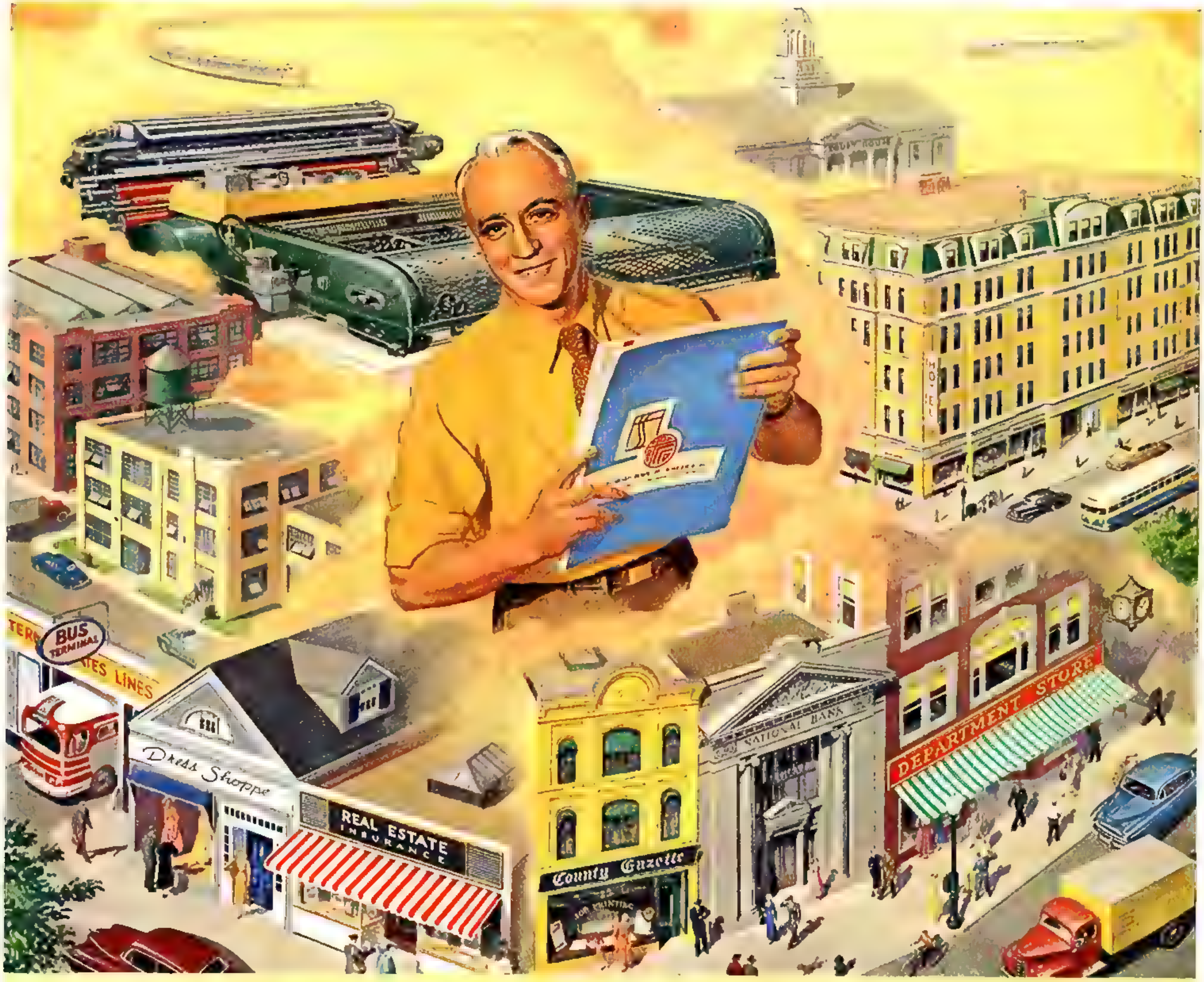
Today, these intricate requirements and countless others are being met at amazingly high speed through the use of IBM Electronic Business Machines.

IBM pioneered in the application of the science of electronics to business machines . . . machines which benefit everyone through increasing the productivity of industry and science.

The device shown is the IBM Electronic Counter, basic unit of IBM Electronic Machines which compute arithmetical problems at tremendous speeds.

IBM

International Business Machines Corporation
World Headquarters Building
590 Madison Avenue • New York 22, New York



You couldn't stay in business without your printer

Let him be your partner in designing printing that gets things done

No matter what your business may be, large or small, your printer is one of the most valuable counselors you have. No one is better qualified to help you plan business printing that will create the right impression for your firm, speed up your office work, and help cut down errors and waste.

That's because your printer *knows* paper and its uses. He works with it all the time. And he knows how important it is to use the right paper for each one of your business requirements.

He knows, for example, that your letters make a better impression, do a better job representing your firm if they are on one of the famous Hammermill letterhead papers—Hammermill Bond or Cockletone Bond, in envelopes to match.

He knows, too, from experience, that your sales bulletins will win customer approval if they are produced on Hammermill Mimeo-Bond. He can furnish handsome printed headings for these, as well as Hammermill Duplicator forms for multiplying important conference reports.

He can supply your accounting department with accurately ruled forms on Hammermill Ledger . . . and checks on tamper-proof Hammermill Safety.

He will suggest the right paper for your other printing needs. For your catalogs and mailing pieces—Hammermill Cover. Hammermill Offset for your product broadsides. Hammermill Opaque for your annual statement. Hammermill Bristol for your card files.

So work with your printer to be sure of the right Hammermill paper for your every printing need. He is always at your service.

HAMMERMILL PAPER COMPANY, ERIE, PENNSYLVANIA

If you need a printer who is ready and willing to supply your printing needs on Hammermill papers, call Western Union by number and ask "Operator 25" for the name of a member of the Hammermill Guild of Printers.

LOOK FOR THE WATERMARK . . . IT IS HAMMERMILL'S WORD OF HONOR TO THE PUBLIC

HAMMERMILL Papers

lots of good things come from GOODYEAR

LOTS OF THINGS LIKE ◇ tires and hundreds of hidden rubber parts on the cars ◇ tires and rims on trucks ◇ oil-resistant soles and heels on workmen's shoes ◇ Vinylfilm in the raincoat ◇ Pliolite resin in the masonry paint that protects a number of the plant buildings ◇ the conveyor belts hauling coal to the power plant in the background ◇ Airfoam seats in the waiting car ◇ rubber fenders on the truck dock in the rear ◇ fire hose in the gatehouse ◇ Pliovic vinyl resin in the youngster's boots ◇ the rubber railroad crossing ◇ the many V-belts and different types of hose that keep the plant humming ◇ and many, many more.

Symbol of busy America—this typical industrial plant. And though it's not a Goodyear plant you'll find an array of Goodyear products on the job.

As always—more people ride on Goodyear tires than on any other kind. But beyond that—research has developed a whole new product world for Goodyear. A world of chemicals, film, foam, flooring, industrial, shoe and metal products, aviation products—even atomic energy and defense products.

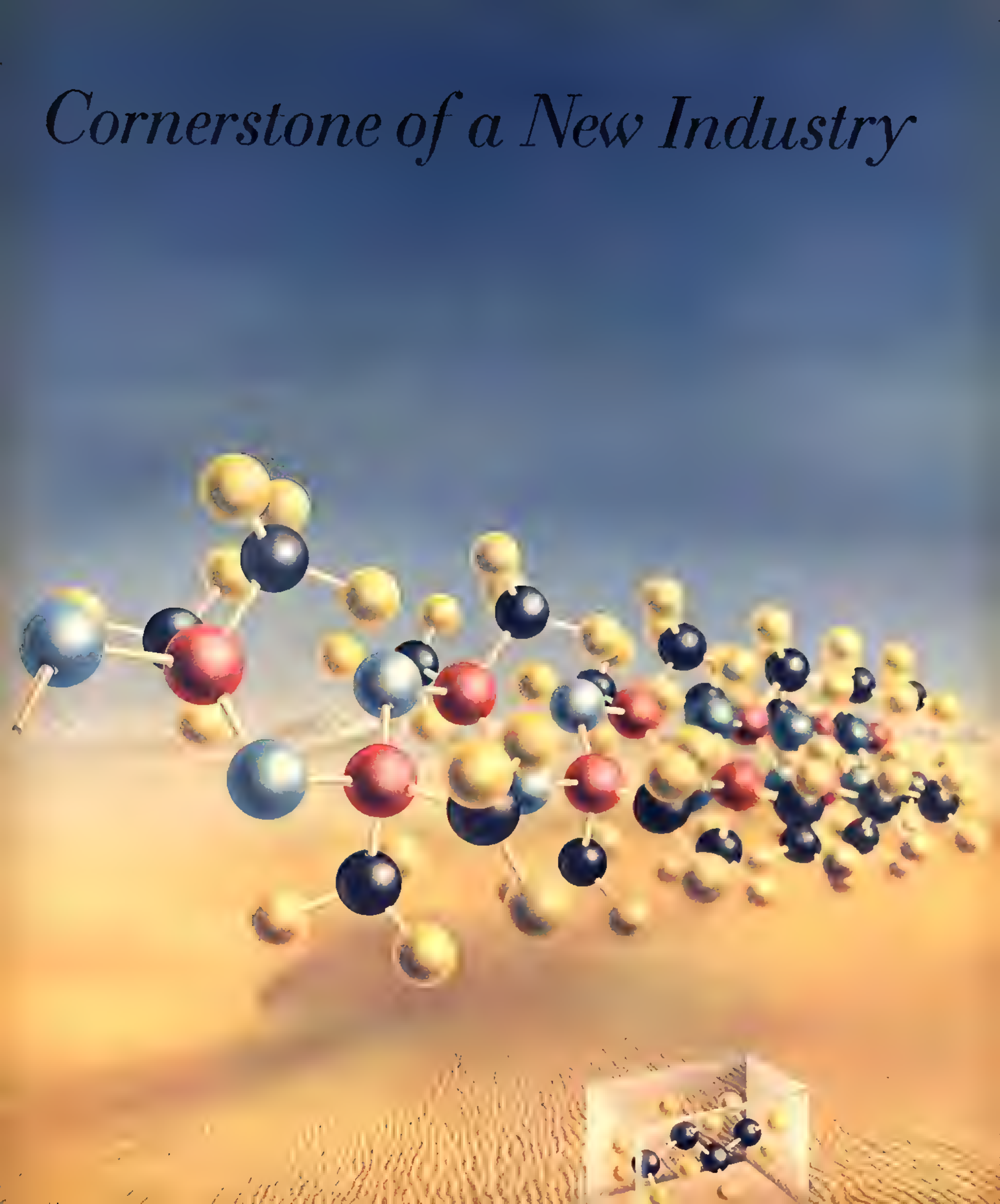
Wherever you live or work, there are Goodyear products contributing to your comfort, convenience and safety, and the safety of your country as well. Look to them for the utmost quality in anything you buy. That's something you can count on—when a research-minded company makes a constant effort to "Protect Our Good Name." Goodyear, Akron 16, Ohio.

Airfoam, Pliolite, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

WHERE RESOURCEFUL RESEARCH ASSURES LEADERSHIP IN TIRES—CHEMICAL PRODUCTS—FILM PRODUCTS—FLOORING PRODUCTS—FOAM PRODUCTS—INDUSTRIAL PRODUCTS—METAL PRODUCTS—SHOE PRODUCTS—AVIATION PRODUCTS—AIRCRAFT.

Cornerstone of a New Industry



...a hand in things to come

Moving mountains across the world

Following rugged paths through lonely African bush country . . . dredging a river bed to carry heavily-laden barges out of the steaming jungles of British Guiana . . . crossing 6,000 miles of ocean to reach a remote island in the South Pacific. This is all part of the job faced by the geologists and mining engineers of Union Carbide as they seek out the ores of chromium, manganese, columbium and other essential alloying metals.

These are the metals that make today's many special steels what they are—sinewy, for the cables of a great suspension bridge . . . sturdy, to support the tallest skyscraper . . . glistening with beauty in stainless steel tableware . . . and suitable for the hundreds of complex parts that make up your automobile. And now the demands of the space age make alloying metals more vital than ever.

Union Carbide moves mountains of ore halfway around the world to assure a dependable supply—almost two million tons a year. And the people of Union Carbide will continue their world wide mining and refining operations to provide the metals so necessary for the products of today and tomorrow.

Learn about the exciting work going on now in metals, carbons, chemicals, gases, plastics and nuclear energy. Write for "Products and Processes" Booklet G, Union Carbide Corporation, 30 E. 42nd St., New York 17, N. Y. In Canada, Union Carbide Canada Limited, Toronto.

UNION CARBIDE

...a hand in things to come

Things are different—up there!

You would be amazed at the tricks nature plays in the stratosphere

As aviation progress has carried man farther into the upper air, he has found that nature has many tricks up her sleeve in the stratosphere. Many things that worked well on the ground wouldn't do as well, or failed completely, in the space beyond the clouds. Things are truly different up there.

CARBON BRUSHES ARE AN EXAMPLE—These brushes are the contact points that carry electricity between moving and stationary parts of motors and generators. They're in electric razors, sewing machines, huge diesel locomotives—and in modern aircraft.

THEY COULDN'T STAND ALTITUDE—Today's high-flying planes require literally hundreds of small electric motors and many carbon brushes. Here was one of nature's quirks, for brushes which worked well on the ground and at lower altitudes couldn't take the thin, dry air of the stratosphere. They'd spark and quickly disintegrate. And if the brushes failed, the motors also would fail.

UCC FOUND THE ANSWER—The people of Union Carbide attacked this problem. Through research they developed special carbon brushes that worked uniformly well at all flight altitudes and helped make stratosphere flying a practical reality.

OTHER AIDS TO FLYING—Better carbon brushes that keep motors and generators running, alloy metals that stand the terrific heat of jet engines, plastic insulation for high-altitude wiring, and oxygen that provides the breath of life in the upper air—these are but a few of the many UCC products that are helping aviation reach new heights.

FREE: *Learn more about the interesting things you use every day. Write for the 1953 edition of "Products and Processes" which tells how science and industry use the* Alloys, Carbons, Chemicals, Gases, *and* Plastics *made by Union Carbide. Ask for Booklet C.*

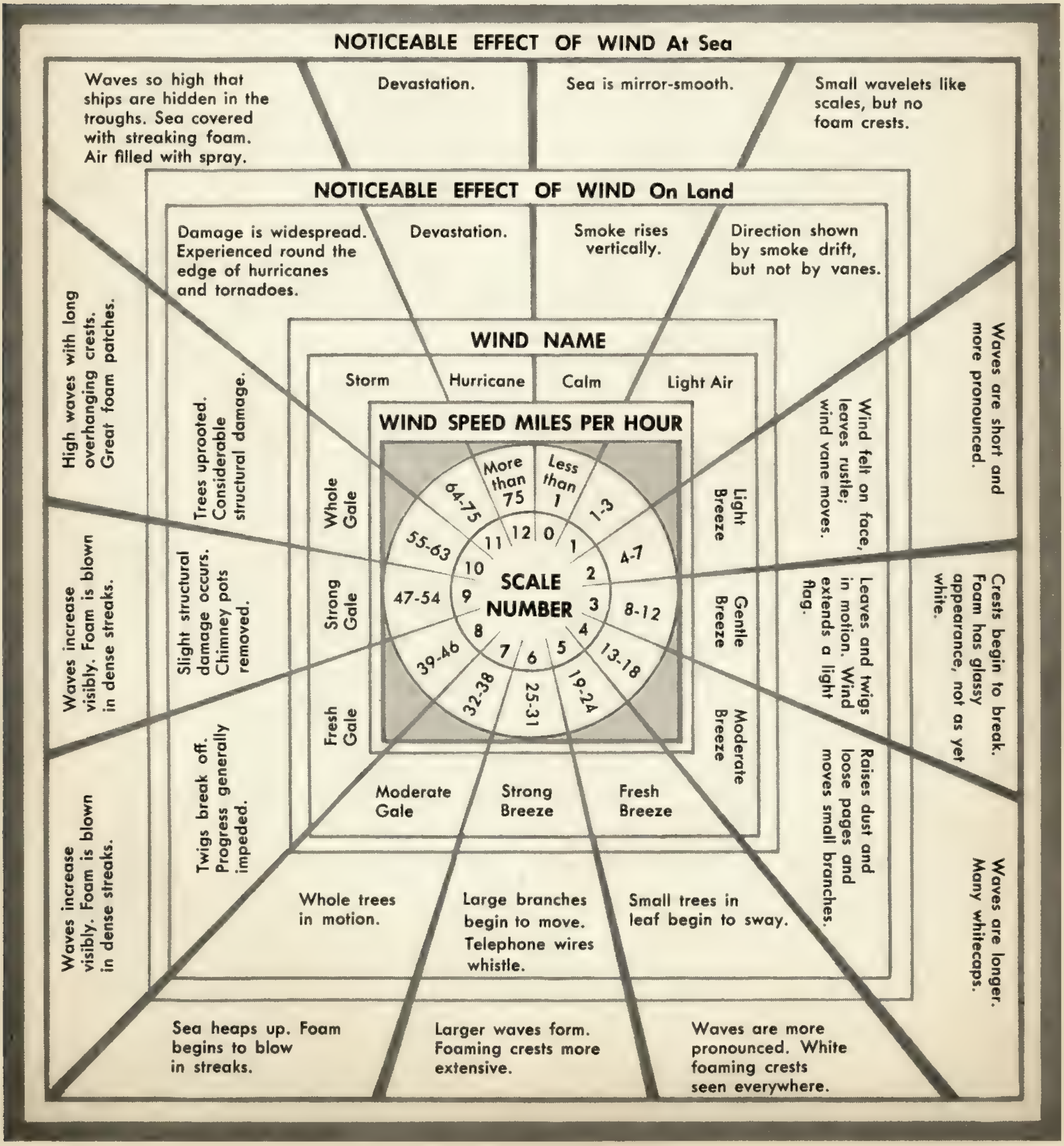
UNION CARBIDE
AND CARBON CORPORATION
30 EAST 42ND STREET UCC NEW YORK 17, N. Y.

UCC's Trade-marked Products of Alloys, Carbons, Chemicals, Gases, and Plastics include

NATIONAL Carbons • ACHESON Electrodes • EVEREADY Flashlights and Batteries • PRESTONE and TREK Anti-Freezes
ELECTROMET Alloys and Metals • HAYNES STELLITE Alloys • PREST-O-LITE Acetylene • PYROFAX Gas
DYNEL Textile Fibers • BAKELITE, KRENE, and VINYLITE Plastics • LINDE Oxygen • SYNTHETIC ORGANIC CHEMICALS

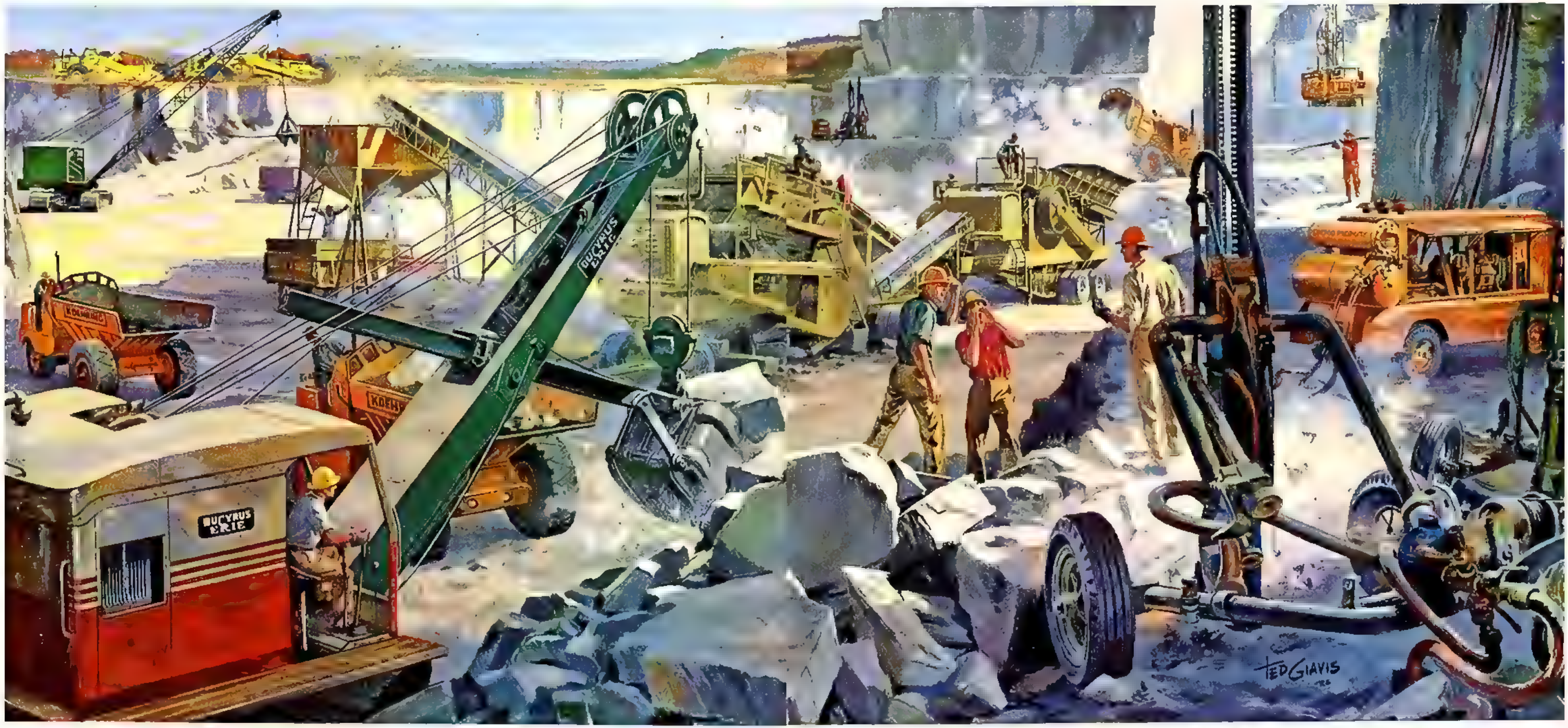
THE BEAUFORT SCALE

MANY years ago, before modern weather instruments were used, a man named Sir Francis Beaufort made up a scale to describe the force of winds by the way they acted over land and sea. Here is a form of this scale. How many of these wind effects have you felt? Scale numbers indicate wind strength.



SCALE NUMBER	WIND SPEED MILES PER HOUR	WIND NAME	NOTICEABLE EFFECT OF WIND On Land	NOTICEABLE EFFECT OF WIND At Sea
0	Less than 1	Calm	Smoke rises vertically.	Sea is mirror-smooth.
1	1-3	Light Air	Direction shown by smoke drift, but not by vanes.	Small wavelets like scales, but no foam crests.
2	4-7	Light Breeze	Wind felt on face, leaves rustle; wind vane moves.	Waves are short and more pronounced.
3	8-12	Gentle Breeze	Leaves and twigs in motion. Wind extends a light flag.	Crests begin to break. Foam has glassy appearance, not as yet white.
4	13-18	Moderate Breeze	Raises dust and loose pages and moves small branches.	Waves are longer. Many whitecaps.
5	19-24	Fresh Breeze	Small trees in leaf begin to sway.	Waves are more pronounced. White foaming crests seen everywhere.
6	25-31	Strong Breeze	Large branches begin to move. Telephone wires whistle.	Larger waves form. Foaming crests more extensive.
7	32-38	Moderate Gale	Whole trees in motion.	Sea heaps up. Foam begins to blow in streaks.
8	39-46	Fresh Gale	Twigs break off. Progress generally impeded.	Waves increase visibly. Foam is blown in dense streaks.
9	47-54	Strong Gale	Slight structural damage occurs. Chimney pots removed.	Waves increase visibly. Foam is blown in dense streaks.
10	55-63	Whole Gale	Trees uprooted. Considerable structural damage.	High waves with long overhanging crests. Great foam patches.
11	64-75	Storm	Damage is widespread. Experienced round the edge of hurricanes and tornadoes.	Waves so high that ships are hidden in the troughs. Sea covered with streaking foam. Air filled with spray.
12	More than 75	Hurricane	Devastation.	Devastation.

Which Diesel's the pick of pits and quarries?



Shown above: Pioneer Portable Rock Crushing Plant Bucyrus-Erie shovel Koehring Dumptors; Chicago Pneumatic rotary compressor, Joy rotary drill; Wooldridge "Cobrette" scrapers, Lorain clamshell. Write for list of over 1000 power applications.

It's GM—used by more than 150 equipment builders

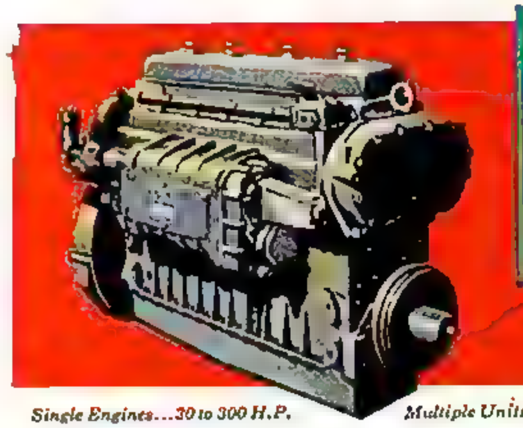
Producing rock and crushed stone for America's gigantic road-building program is a slam-bang operation that calls for rugged equipment with plenty of get-up-and-go.

It's a "natural" for General Motors Detroit Diesel engines because these compact, quick-accelerating two-cycle Diesels outwork other engines—both gasoline and Diesel—on any job from 30 H.P. up.

This fact—plus world-wide service availability—explains why more than 150 manufacturers install GM Detroit Diesels in over 1000 different applications of power machinery.

These dependable Diesels are the choice of pit and quarry operators in portable air compressors, dredges, rock crushers, shovels, scrapers and other heavy hauling units.

Your nearby distributor or dealer welcomes the opportunity to show you the savings you can make with GM Detroit Diesel power on *your* job. It's America's First Choice Diesel *because it does more work at less cost!*



GM
GENERAL MOTORS
DIESEL
POWER

Single Engines...30 to 300 H.P. *Multiple Units...Up to 893 H.P.*

DETROIT DIESEL

Engine Division of General Motors
Detroit 28, Michigan

Regional Offices:
New York, Atlanta, Detroit, Chicago, Dallas, San Francisco

In Canada:
GENERAL MOTORS DIESEL LIMITED, London, Ontario

America's First Choice Diesel Engine

February 1957

we mean that the water in it has disappeared. What happened to it? The tiny bits or molecules which make up water have jumped into the air and are bounc-

the air "water vapor." The amount of water in the air varies at different times, but there is probably a quart or more of water in the air in your bedroom.

This picture illustrates evaporation taking place in a pond. The water is "drying up." Actually, the molecules of water bounce up toward the sky. The water carried along by the air is called water vapor.

TR 4
WT 58 400
ET 14
WT 6000 LBS
ET 14
WT 6000 LBS
E I 13
WT 23 600 LBS
E IV 13
WT 15 500 LBS

Automation?

YOU NAME IT . . . WE'LL TAPE IT!

"Looks Good... *without Rose-Colored Glasses"*

It doesn't take rose-colored glasses to make a coal preparation plant look good. Profit statements and cost records have revealed to management of plants already in operation from Alaska to Brazil that it pays big to produce premium fuel.

To coal mine directors a new coal preparation plant means better service to customers . . . more new customers knocking at the door for prepared fuel . . . a stimulating influence on the sales department . . . a growing "in-the-black" operation.

To coal mine production men it means an automatic plant capable of producing more tons of specification fuel in a wide variety of sizes with less men and with maintenance at a new low.

Small wonder then that technical experts, who have engineered such plants, are welcomed in a discussion to which they can bring so much convincing evidence that mines equipped with McNally Pittsburg preparation plants are consistently making dividends.

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation, Pittsburg, Kans. • Chicago 1, Ill. • Pittsburgh 22, Pa.
Caixa Postal 1310, Rio de Janeiro, Brazil

for Their Protection

MERCUROCHROME

It is dangerous to neglect wounds, however small; even scratches and small cuts may cause serious infections if they are not properly treated.

Merchrochrome (H. W. & D. brand of merbromin, dibromoxymercurifluorescein-sodium) is one of the best antiseptics for first aid use. It is accepted by the Council on Pharmacy and Chemistry of the American Medical Association for this purpose.

The 2% aqueous solution in applicator bottles does not sting and can be applied safely to small wounds. Children do not hesitate to report their injuries promptly when Mercurochrome is the household antiseptic, because they know that they will not be hurt. Other advantages are that solutions keep indefinitely and the color shows just where it has been applied.

Doctors have used Mercurochrome in their practice for more than 24 years.

Keep a bottle of Mercurochrome handy for the first aid care of all minor wounds. Do not fail to call a physician in more serious cases.

MERCUROCHROME
General Antiseptic for First Aid
MERCUROCHROME
General Antiseptic for First Aid
MERCUROCHROME

This seal denotes acceptance of Mercurochrome for New and Non-official Remedies by the Council on Pharmacy and Chemistry of the American Medical Association.

HYNSON, WESTCOTT & DUNNING, INC.

Baltimore 1, Maryland

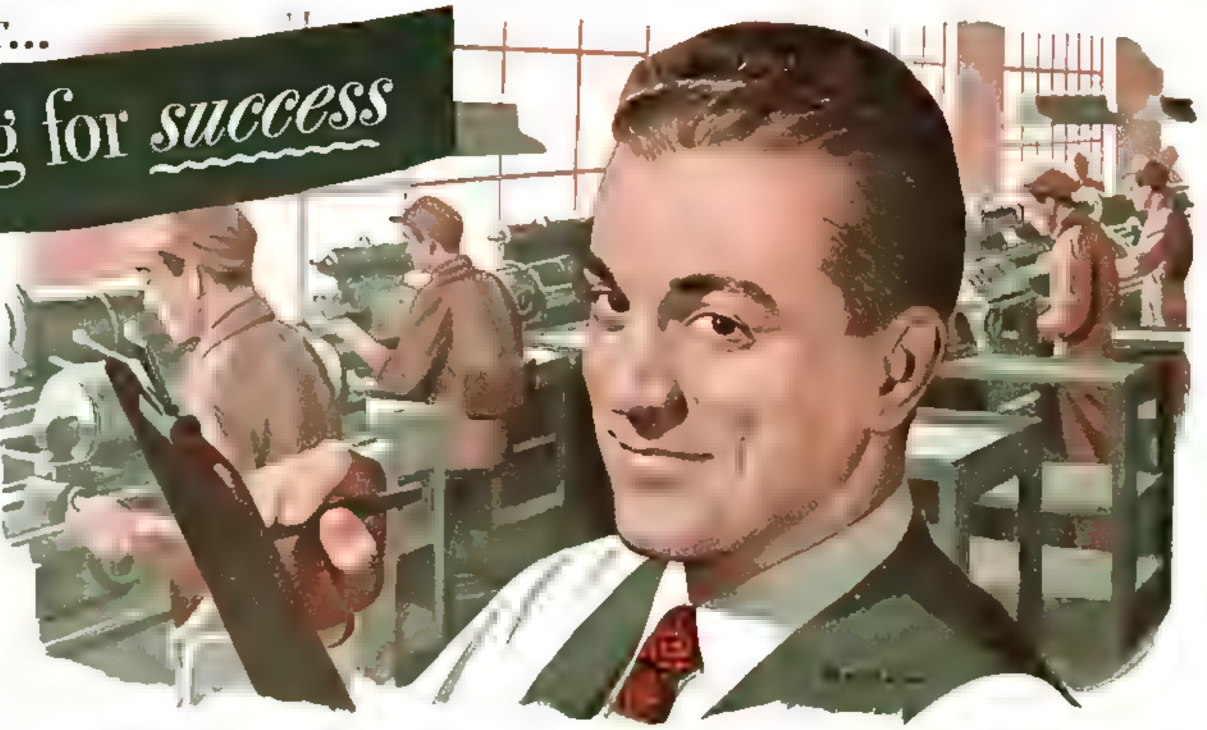
HEADS A CORPORATION...

...*but* he's heading for *failure*

He is doing a great job today . . . laying strong foundations for his company's future. Yet, he has no clear plan for his family's tomorrow. He knows a big income isn't always security...but he thinks he can take care of his personal future later. Meanwhile, if anything happens to him, his family's security will be swept away. There's a way to prevent this failure.

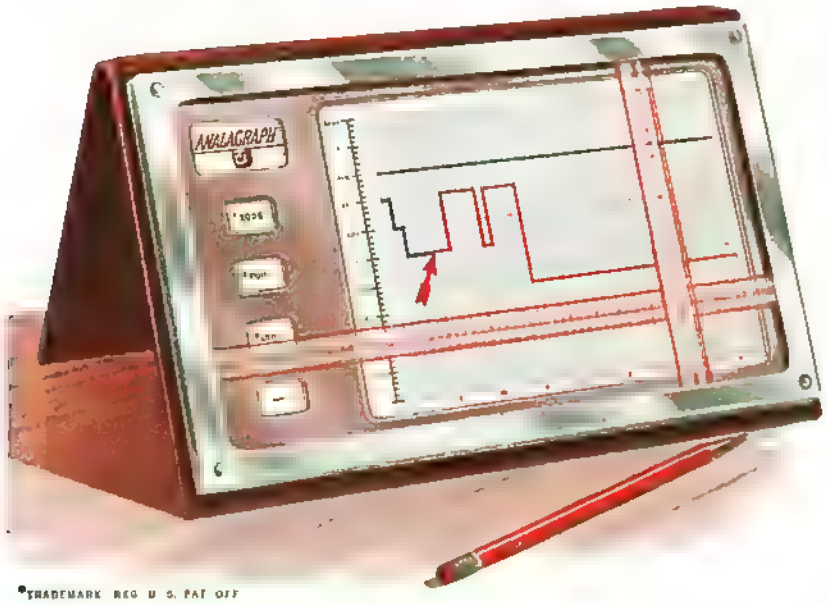
HEADS A DEPARTMENT...

...*and* he's heading for *success*



He is climbing the ladder. His modest assets...life insurance, war bonds, savings, Social Security . . . are the basis of a plan for the future. It can be developed step-by-step over the years as his income changes. A debt-free home, college for his children, his retirement . . . are clearly charted the *Analagraph** way.

Don't guess about your future...*Analagraph it!*



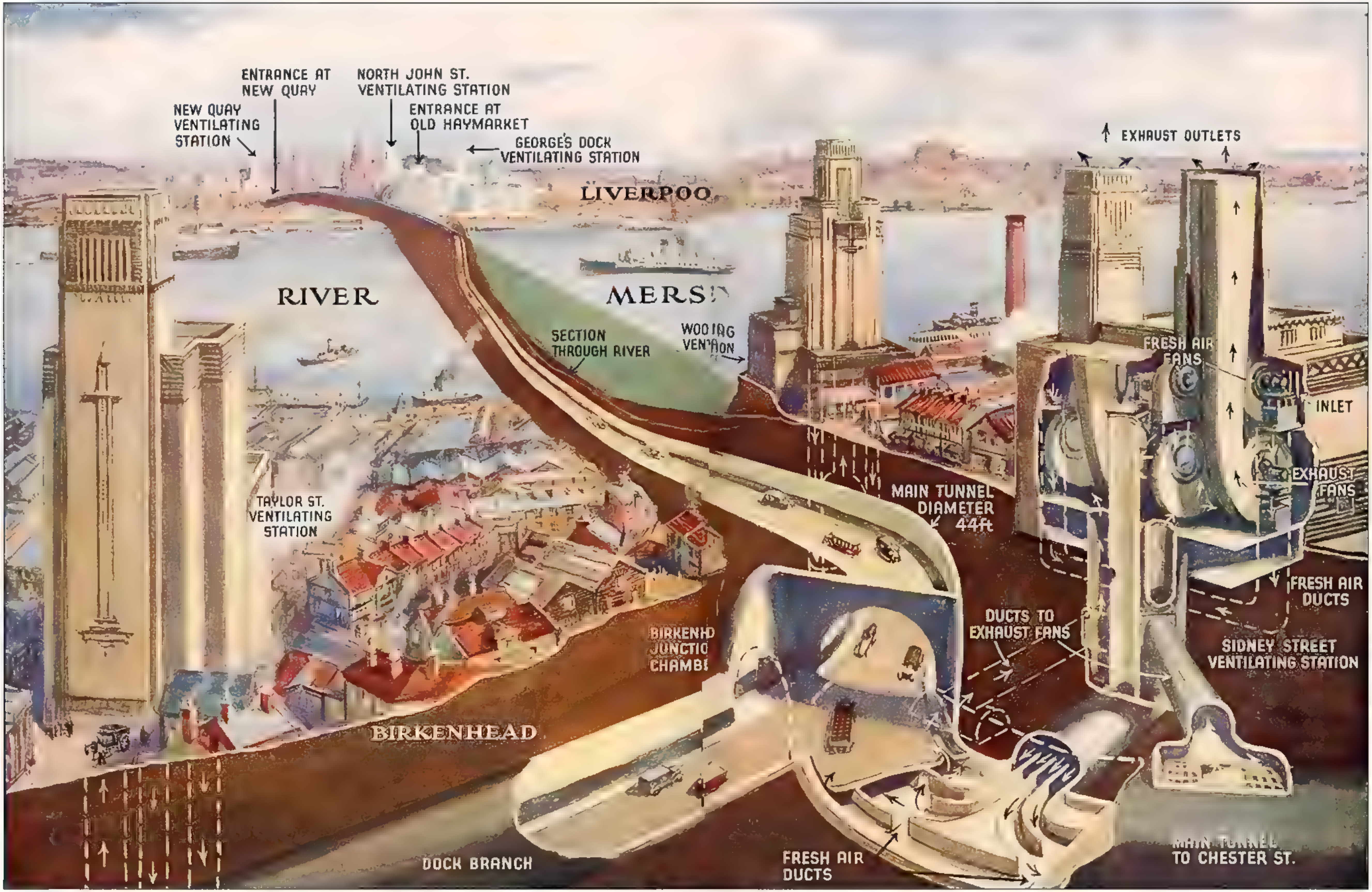
- With the Mutual Benefit's exclusive *Analagraph* you can chart a practical plan for your family's future . . . a plan easily adjustable to changing income and needs. You will see clearly exactly how much all your property, including life insurance, will bring as income . . . for your family's protection if you die . . . for your retirement if you live.
- You'll find Analagraphing your family's future a fascinating and enlightening experience. It costs you nothing. There's no obligation. Simply call your local Mutual Benefit agent. Or write today for the interesting new booklet, "The Analagraph—What It Can Do For You."

P.S. Where estate problems are complex, your Mutual Benefit representative will cooperate with your legal adviser and the trust officer of your bank to assure maximum security for you and your family.

THE MUTUAL BENEFIT
LIFE INSURANCE COMPANY

ORGANIZED IN 1845 NEWARK, NEW JERSEY

*TRADEMARK REG. U. S. PAT. OFF.


ENTRANCE AT NEW QUAY
NORTH JOHN ST. VENTILATING STATION
NEW QUAY VENTILATING STATION
ENTRANCE AT OLD HAYMARKET
GEORGE'S DOCK VENTILATING STATION
EXHAUST OUTLETS
LIVERPOO
RIVER
MERS
SECTION THROUGH RIVER
WOO ING VEN ATION
FRESH AIR FANS
INLET
EXHAUST FANS
MAIN TUNNEL DIAMETER 44ft
TAYLOR ST. VENTILATING STATION
FRESH AIR DUCTS
DUCTS TO EXHAUST FANS
BIRKENHD JUNCTIO CHAMB
SIDNEY STREET VENTILATING STATION
BIRKENHEAD
DOCK BRANCH
FRESH AIR DUCTS
MAIN TUNNEL TO CHESTER ST.

If they're so wonderful—why not? Maybe you've read about the miracle-working properties of a newly developed drug; or heard about the almost incredible cure it worked for some friend. You try to buy it, and find you can't without a doctor's prescription. And you wonder why they make such a "universal boon to mankind" so hard for you to get!

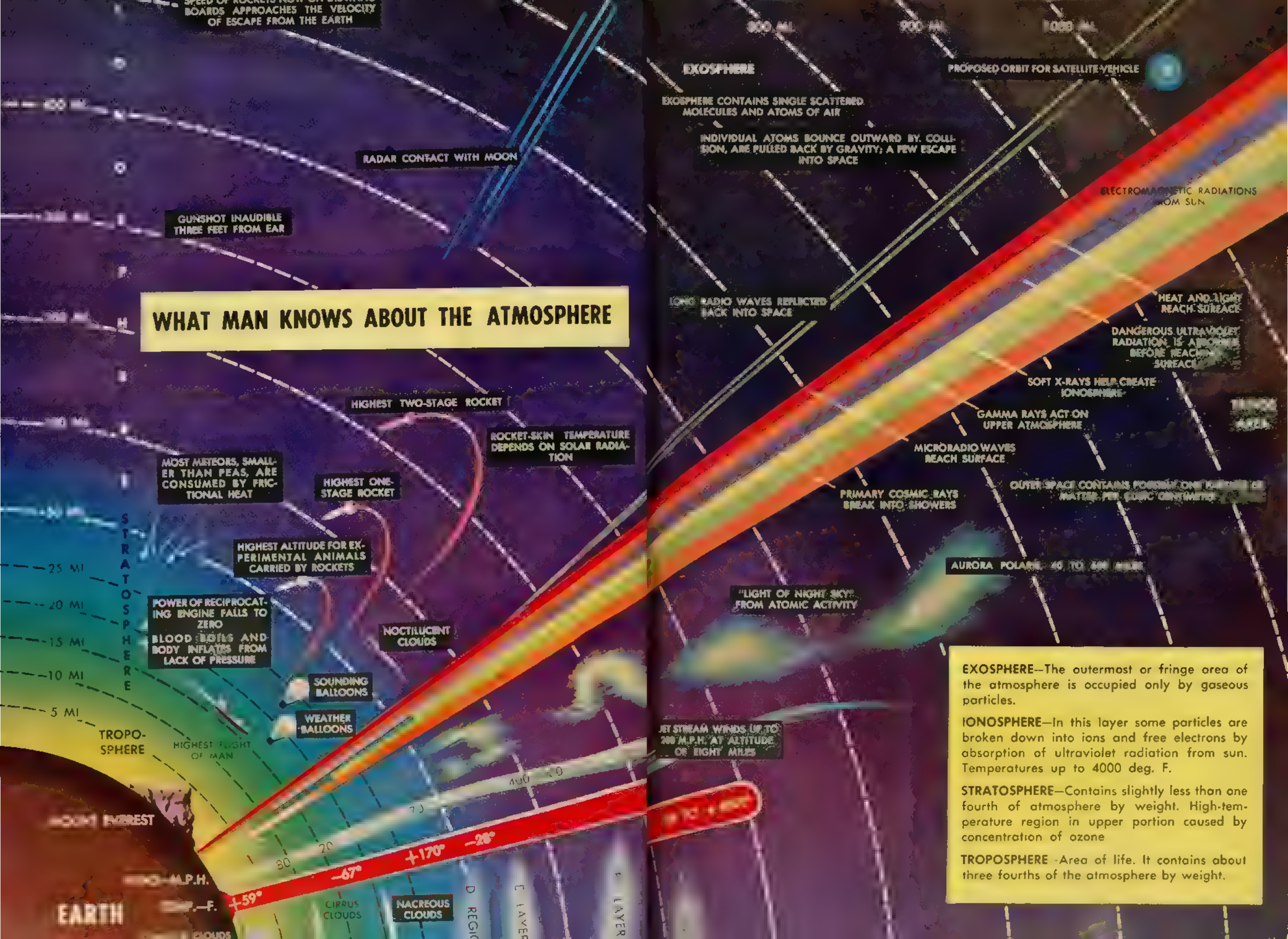
As makers of more than seven hundred pharmaceutical products, including a number of these "wonder drugs", we at Parke-Davis know how effective the newer drugs can be—*when properly used*. We know also that no drug will work "miracles" for everyone, and that only the skill and knowledge of a physician can make it work effectively for you.

Medical research today is writing one of the most heartwarming chapters in the history of mankind. Today—in addition to all the older established remedies—your doctor has at his service the many new discoveries of medical and pharmaceutical science. The surest way to take full advantage of modern medical progress is to see your doctor —and see him *promptly*—when you become ill.

PARKE, DAVIS & CO., LTD.
Manufacturing Laboratories, Walkerville, Ontario

Makers of medicines since 1866

WHAT MAN KNOWS ABOUT THE ATMOSPHERE


SPEED OF ROCKETS NOW ON DRAWING BOARDS APPROACHES THE VELOCITY OF ESCAPE FROM THE EARTH
400 MI.
300 MI.
200 MI.
100 MI.
50 MI.
25 MI
20 MI
15 MI
10 MI
5 MI
800 MI.
900 MI.
1000 MI.
RADAR CONTACT WITH MOON
GUNSHOT INAUDIBLE THREE FEET FROM EAR
EXOSPHERE
EXOSPHERE CONTAINS SINGLE SCATTERED MOLECULES AND ATOMS OF AIR
INDIVIDUAL ATOMS BOUNCE OUTWARD BY COLLISION, ARE PULLED BACK BY GRAVITY; A FEW ESCAPE INTO SPACE
PROPOSED ORBIT FOR SATELLITE-VEHICLE
ELECTROMAGNETIC RADIATIONS FROM SUN
LONG RADIO WAVES REFLECTED BACK INTO SPACE
HEAT AND LIGHT REACH SURFACE
DANGEROUS ULTRAVIOLET RADIATION IS ABSORBED BEFORE REACHING SURFACE
SOFT X-RAYS HELP CREATE IONOSPHERE
GAMMA RAYS ACT ON UPPER ATMOSPHERE
MICRORADIO WAVES REACH SURFACE
PRIMARY COSMIC RAYS BREAK INTO SHOWERS
OUTER SPACE CONTAINS POSSIBLY ONE PARTICLE OF MATTER PER CUBIC CENTIMETER
AURORA POLARIS 40 TO 600 MILES
"LIGHT OF NIGHT SKY" FROM ATOMIC ACTIVITY
HIGHEST TWO-STAGE ROCKET
ROCKET-SKIN TEMPERATURE DEPENDS ON SOLAR RADIATION
MOST METEORS, SMALLER THAN PEAS, ARE CONSUMED BY FRICTIONAL HEAT
HIGHEST ONE-STAGE ROCKET
HIGHEST ALTITUDE FOR EXPERIMENTAL ANIMALS CARRIED BY ROCKETS
STRATOSPHERE
POWER OF RECIPROCATING ENGINE FALLS TO ZERO
BLOOD BOILS AND BODY INFLATES FROM LACK OF PRESSURE
NOCTILUCENT CLOUDS
SOUNDING BALLOONS
WEATHER BALLOONS
TROPOSPHERE
HIGHEST FLIGHT OF MAN
JET STREAM WINDS UP TO 200 M.P.H. AT ALTITUDE OF EIGHT MILES
MOUNT EVEREST
WIND—M.P.H.
TEMP.—F.
EARTH
CLOUDS
+59°
-67°
+170°
-28°
30
20
70
400
CIRRUS CLOUDS
NACREOUS CLOUDS
D REGION
E LAYER
F LAYER

EXOSPHERE—The outermost or fringe area of the atmosphere is occupied only by gaseous particles.

IONOSPHERE—In this layer some particles are broken down into ions and free electrons by absorption of ultraviolet radiation from sun. Temperatures up to 4000 deg. F.

STRATOSPHERE—Contains slightly less than one fourth of atmosphere by weight. High-temperature region in upper portion caused by concentration of ozone

TROPOSPHERE—Area of life. It contains about three fourths of the atmosphere by weight.

Working for you everywhere—

Little black blocks...called brushes

You wouldn't touch an object spinning around at thousands of revolutions per minute. But just such a contact is necessary to transfer electricity between the moving and the stationary parts of electric motors that serve us all.

HOW DOES ELECTRICITY bridge the gap? Through little blocks of carbon or graphite called brushes.

Nearly 500 brushes, each the size of a pack of cards, are in a diesel electric locomotive, while a tiny pair of brushes, hardly the size of a pencil eraser, do the job in your vacuum cleaner.

WHY BRUSHES OF CARBON or graphite? Because they are excellent conductors of electricity and are dependable and long lasting, despite constant pressure against moving parts.

NEARLY 60 YEARS AGO, the people of Union Carbide began making carbon brushes. Today, UCC makes millions of brushes each year, in thousands of different sizes and types. Wherever electricity is generated and used—on, above, or beneath the earth and water—these brushes are at work, your dependable, seldom-seen servants.

FREE: *Learn how* ALLOYS, CARBONS, GASES, CHEMICALS, *and* PLASTICS *improve many things that you use. Ask for "Products and Processes" booklet X6.*

UNION CARBIDE
AND CARBON CORPORATION
30 EAST 42ND STREET UCC NEW YORK 17, N. Y.
In Canada: UNION CARBIDE CANADA LIMITED

UCC's Trade-marked Products include

NATIONAL Carbons
ACHESON Electrodes
EVEREADY Flashlights and Batteries
ELECTROMET Alloys and Metals
HAYNES STELLITE Alloys
PRESTONE Anti-Freeze
LINDE Silicones
DYNEL Textile Fibers
PYROFAX Gas
UNION Carbide
BAKELITE, VINYLITE, and KRENE Plastics
LINDE Oxygen
PREST-O-LITE Acetylene
SYNTHETIC ORGANIC CHEMICALS

A pound of fuel to light Chicago

THAT'S ALL THE URANIUM needed to produce atomic power equal to the energy in 3 million pounds of coal. It could light Chicago for a full day!

ATOMIC RESEARCH is focused on developing an economical way to produce electricity from atomic energy. Scientists at Oak Ridge National Laboratory, which Union Carbide Nuclear Company operates for the Atomic Energy Commission, have already built experimental power producing reactors that are serving as a guide to commercial atom power plants.

PEACEFUL USES for the atom have also been found in the diagnosis and treatment of disease. Radioactivity is uncovering important facts about plant and animal growth. Industry uses the atom's radiation to control production processes, to test product quality, and for research.

THE CHALLENGING FIELD of atomic energy is not new to the people of Union Carbide. They have been pioneering in every phase of this exciting business—from the mining of uranium ore to harnessing the atom for our future comfort and well-being.

FREE: *To learn more about the atom and the tremendous strides made in the peaceful applications of atomic energy, write for the illustrated booklet "The Atom In Our Hands."*

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AND CARBON CORPORATION
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In Canada: UNION CARBIDE CANADA LIMITED, Toronto

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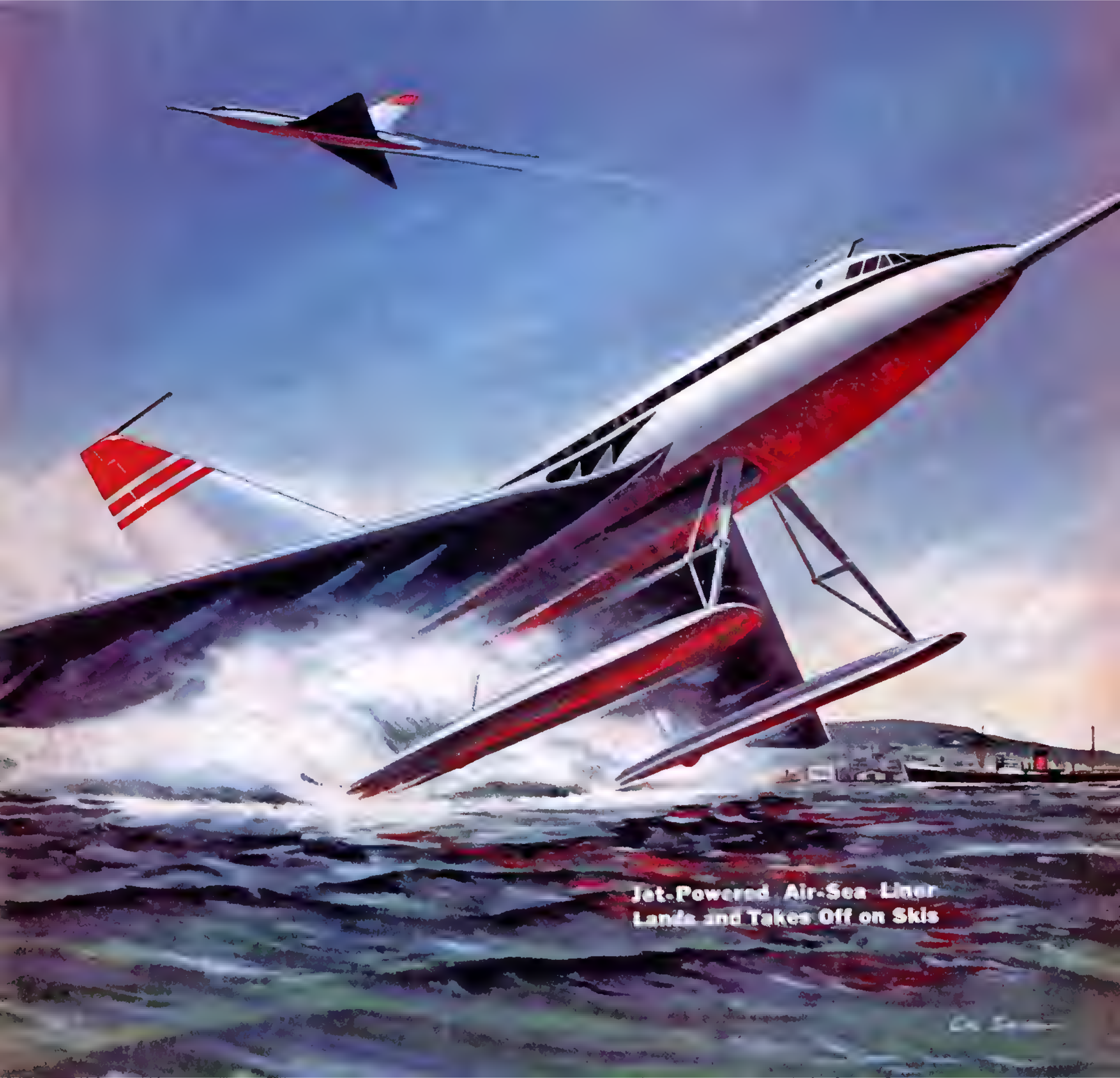
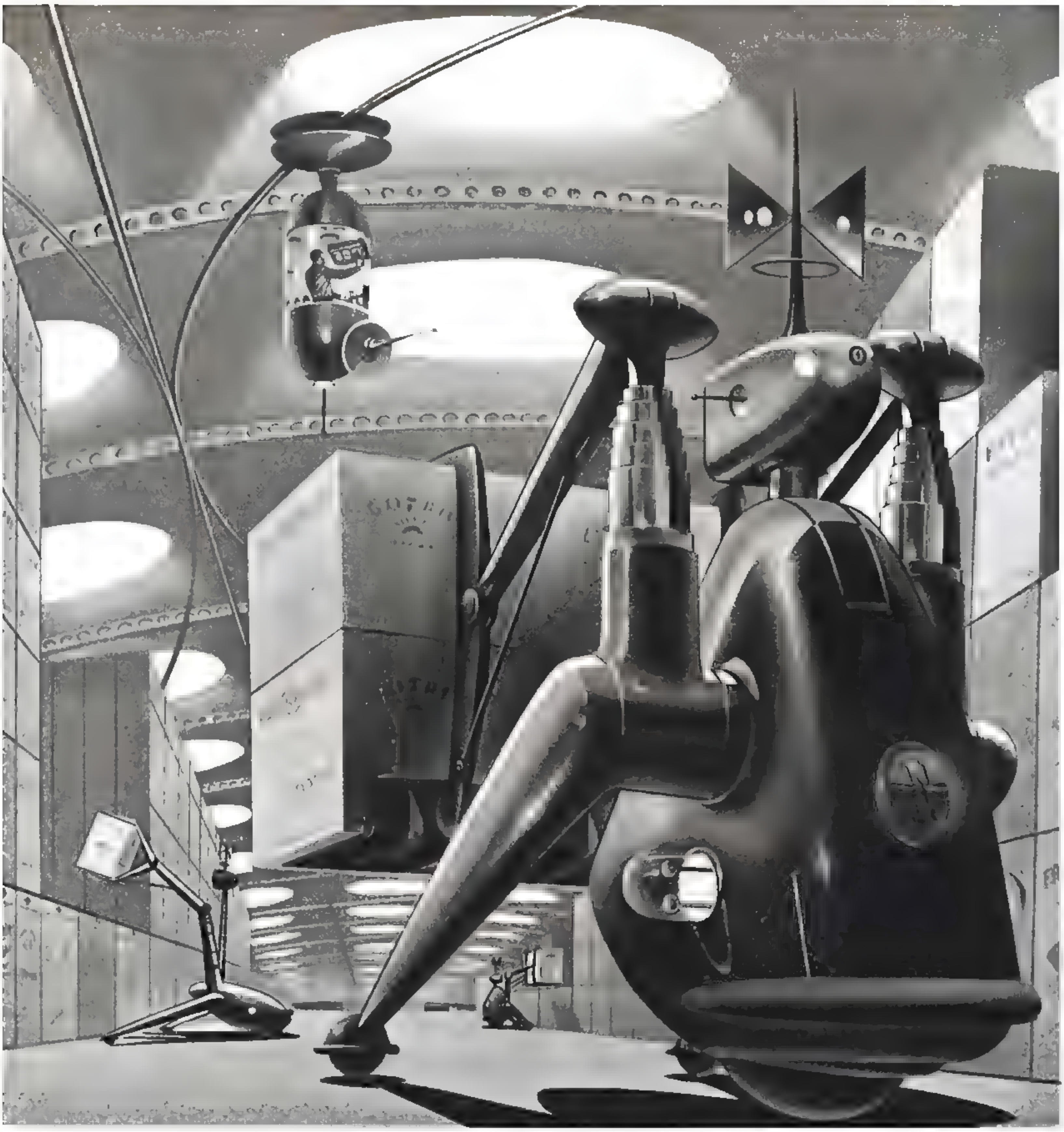
ACHESON Electrodes
SYNTHETIC ORGANIC CHEMICALS
HAYNES STELLITE Alloys
PREST-O-LITE Acetylene
PYROFAX Gas
PRESTONE Anti-Freeze
Dynel Textile Fibers
UNION Carbide
EVEREADY Flashlights and Batteries
LINDE Oxygen
BAKELITE, VINYLITE, and KRENE Plastics
UNION CARBIDE Silicones



Jet-Powered Air-Sea Liner
Lands and Takes Off on Skis



MACHINERY

Automation: magic warehousing, too?

In the "automatic" days to come, rolling robots will fill the order, label it and load it—all at the bidding of a punch-card many miles away. Such machines will be thrice complex. Yet, as today, they will have in generous measure that characteristic which makes American machinery world-famous—rugged dependability.

An important way engineers achieve dependability is by extensive use of oil seals to protect bearings, keep lubricants in place, keep dirt and water out.

National pioneered and developed oil and grease seals. We've made millions of them for machines and appliances, off-highway equipment, railway locomotives and cars—and hundreds of millions for America's truck, bus and automobile fleet. Today we can offer you over 2,500 different standard-design seals—a wide selection of types and sizes, with sealing members of leather or famous National Syntech® synthetic rubber. We also design and manufacture special seals for special problems.

NATIONAL MOTOR BEARING CO., INC.

General Offices: Redwood City, California. **Sales Offices:** Chicago, Cleveland, Dallas, Detroit, Downey (Los Angeles County), Milwaukee, Newark, Van Wert, Wichita. **Plants:** Redwood City, Downey and Long Beach, California; Van Wert, Ohio. **Products:** Syntech® and Leather, Oil, Fluid and Grease Seals, O-Rings, Airtron® Ducts, Silicone parts, Shims.

15,000,000 visitors later, this home still has a future

The Monsanto "Home of the Future" at Disneyland has withstood 15 million visitors, high winds and hot sun . . . all without signs of distress. The home is built almost entirely of plastics, either alone or in combination with traditional building materials. Even most furnishings are "chemically tailored" . . . including fabrics and carpets made with Acrilan® fiber. And that all-plastic home is still in superb shape after 15 million visitors . . . and seven years later. How's *that* for durability? Another example of how Monsanto moves ahead to serve you. Monsanto, St. Louis, Missouri 63166.

Acrilan—TM of Monsanto's Chemstrand Company Division

Monsanto

More Efficiency Through Copper

Under the magic of science, the thick, dark, complex drop of crude oil breaks up into hundreds of specialized products. It becomes gasoline for engines—fuel oil for heat and power—lubricants, synthetic rubber, plastics, medicines, and insecticides.

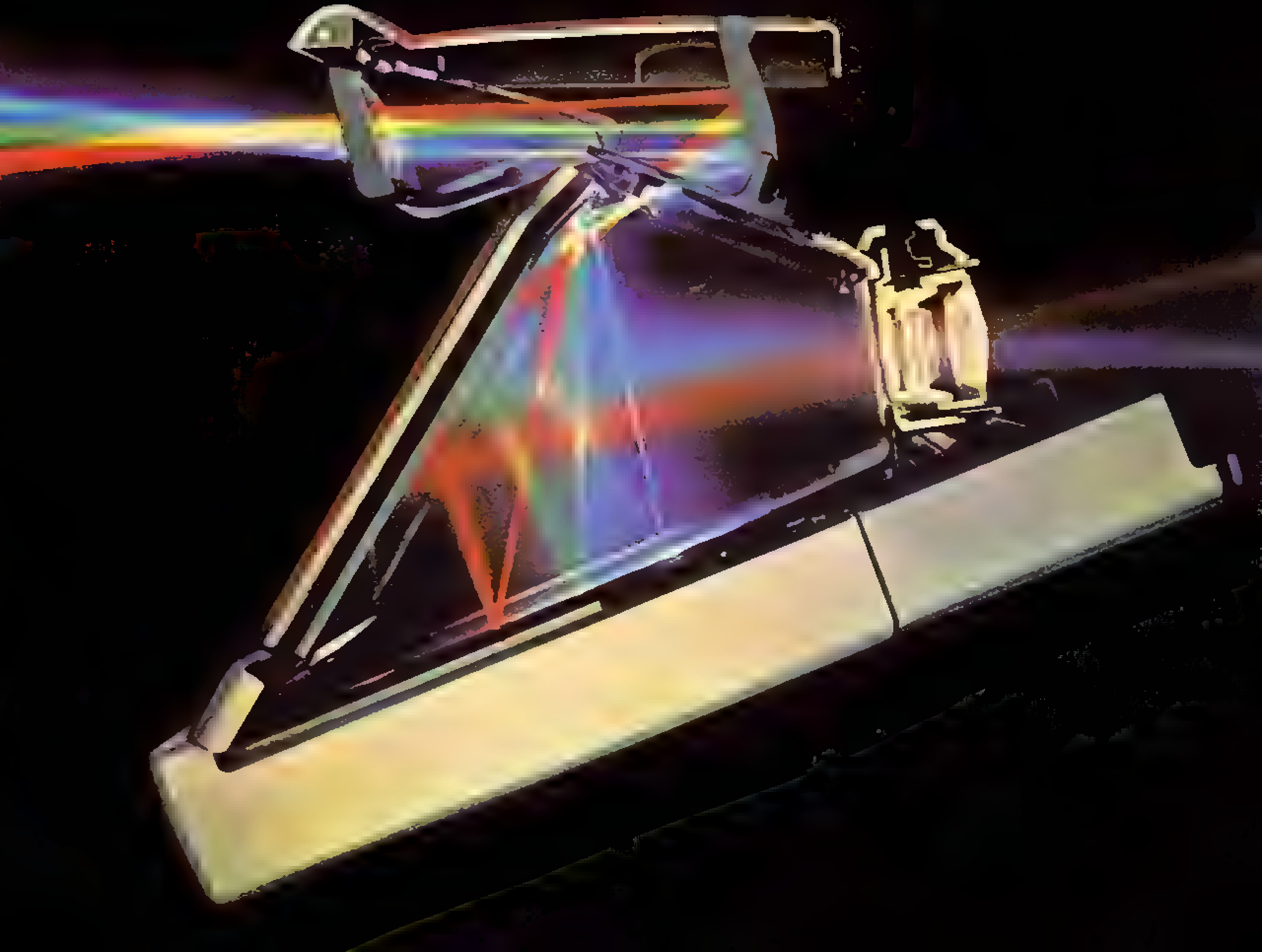
It's wonderful that man can unlock the power in crude oil. It's more wonderful that he does it so *efficiently* that Americans enjoy the lowest prices in the world for gasoline, oil, and other petroleum products. Copper helps make this economy possible, because it withstands corrosion and has unmatched thermal conductivity.

Like crude oil, copper is the mother of hundreds of specialized products too. And these children of copper—these hundreds of alloys—can often work even more efficiently than the mother metal. Revere has amassed the greatest file of copper lore in the world. Revere developments—the Arsenical Admiralty Condenser Tubes used in oil refining for example—have made it possible for many industries to step up efficiency while cutting down on installation, operating and replacement costs. Revere's copper lore and specialized Technical Advisory Service are at the command of every industry.

Revere Copper and Brass Incorporated
Executive Offices: *230 Park Avenue, New York, New York*

AMERICA
is on the Copper standard
..the standard for Copper is
REVERE

sept 1940



What's New in Mnemonics?

It's the new Univac II—finest business computing system yet developed. The famous Univac of Remington Rand is still the *only* completely self-checking system . . . the only one which can read, write, and compute simultaneously. And now Univac adds to these superior features the speed of a magnetic-core memory.

Remington Rand has pioneered in this important new development, installing, a year ago, the first commercially available electronic computer to use magnetic-core storage successfully.

Mnemonics, says Webster, is "the art of improving the efficiency of the memory." And, as far as electronic computing is concerned, the new Univac II carries this art to a point far beyond its contemporaries.

With this new magnetic-core storage, the internal memory of the Univac has been doubled, giving instantaneous access to 24,000 alphabetic or numeric characters. If needed, this capacity can be further increased to 120,000 characters.

Univac's external memory – magnetic tape – now has greater capacity, too, increasing input and output to 20,000 characters per second . . . equivalent to reading or writing every character on this page more than 1,000 times a minute.

These new Remington Rand developments can be incorporated into any existing Univac installation to double its speed of operation and increase its economy still further. Write to . . .

ELECTRONIC COMPUTER DEPARTMENT, ROOM 1705 **Remington Rand** INC. 315 FOURTH AVENUE, NEW YORK 10, NEW YORK

JULY 1955

This critical operation allows no margin for error

The men in the picture are assembling a "repeater" for use in undersea telephone cable. They work in a dust-free atmosphere, under precisely controlled temperature and humidity conditions. Their goal: perfection or as close to it as man can come.

It has to be. For repeaters like this one are used to maintain the strength of communications signals in the deep-sea telephone cables that connect continents together. They must work unseen and untouched for at least 20 years at the bottom of the ocean. Repairs would require lifting the cable from the ocean floor, a costly and time-consuming operation. That's why the repeater is manufactured by Western Electric with a precision and care unmatched in commercial manufacture. That's why all of the over 2,000 parts in its six-foot length—even the selected materials from which they are made—have to pass exacting tests to assure that they will work, not merely now, but years hence under the enormous weight of ocean.

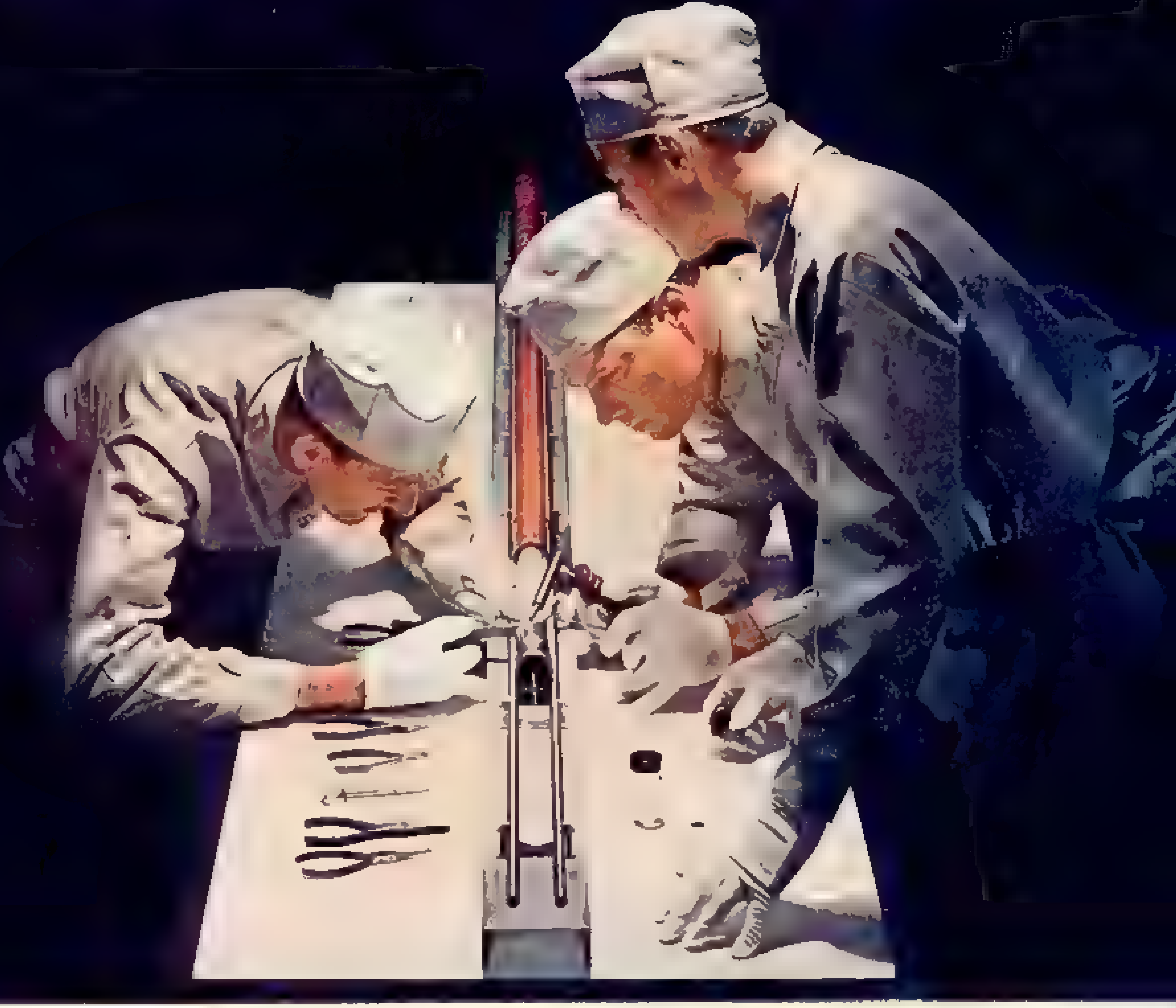
Whether it be to connect continents or neighborhoods, providing high-quality telephone service takes more than skill. It takes teamwork. It's essential that the people who design, make, and operate telephone equipment share a common goal. And they do, as members of the Bell System.

Bell Telephone Laboratories developed the repeater. Western Electric makes it.

And the Bell Telephone companies—as part of a nation-wide telephone network, together with communications agencies and companies overseas—use it to speed communications for an ever-busier world.

Thus Bell System teamwork, joining people with a shared responsibility for ever-better telephone service, creates communications progress.

We work best because we work together.



Western Electric

BELL SYSTEM

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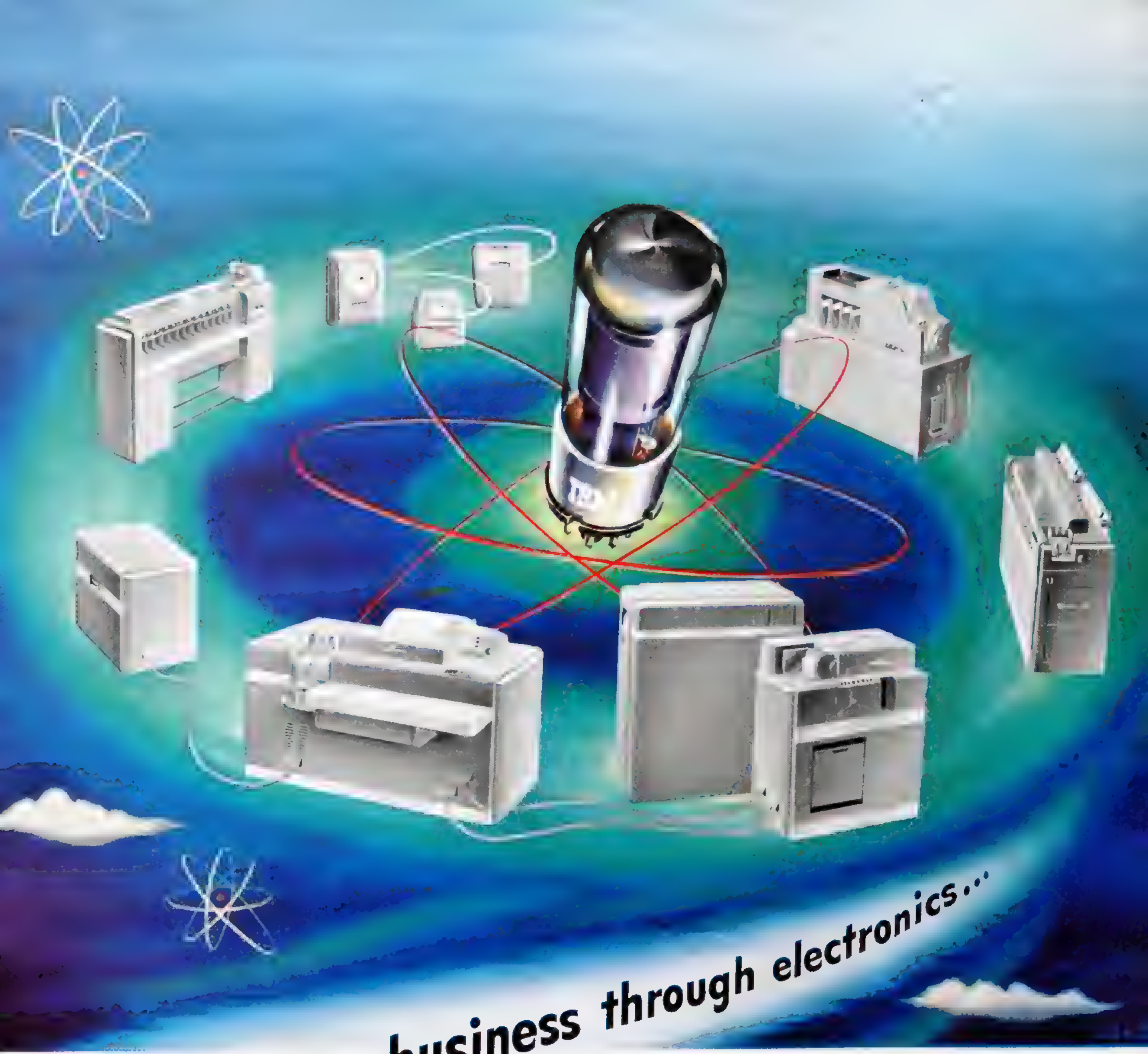

Speeding business through electronics...

Through IBM research and development, the remarkable abilities of electron tubes have been put to work in business machines.

Electron tubes—fast, versatile, accurate—are used in the IBM Machines pictured here to calculate at extraordinary speeds, to "remember" the answers to intricate computations, to follow long series of instructions, to control the flow of electricity with amazing precision.

IBM Electronic Business Machines are cutting the time between questions and answers—helping science and industry produce more good things for more people.

The IBM machines illustrated use electronic principles. Clockwise from the top, they are: Electric Time System, with Electronic Self-regulation; Alphabetical Collator; Statistical Machine; Card-programmed Calculator, including Calculating Punch; Punched Card Sorter.

For descriptive literature, write to Dept. N.

IBM

International Business Machines Corporation
590 Madison Avenue • New York 22, New York

Intense Cold . . . Fierce Heat . . . Terrific Pressure

—forces of nature used by UCC scientists to work for you

HEAT SO FIERCE it makes steel boil . . . cold so intense it turns the very air to liquid . . . pressure so great it has the force of 600 hurricanes . . . space so "empty" that nothing could live in it.

THESE FORCES OF NATURE are used by industry in making so many of the things we take for granted today. The electric arc furnace — 6,000 degrees hot—is the birthplace of alloying metals that go into stainless steel and other fine steels. Oxygen, so vital to medicine and industry, is extracted from air made liquid when cooled to more than 300 degrees below zero.

ETHYLENE GAS SQUEEZED under pressure of 15 tons per square inch changes into polyethylene. This remarkable plastic is used to make such familiar things as unbreakable nursing bottles, squeeze-spray containers, and transparent wrappings. Exposing natural gas to terrific pressures and the "nothingness" of vacuum have been key steps in making hundreds of new chemicals during the last 20 years.

THESE ARE BUT A FEW examples of how industrial scientists such as those of Union Carbide have discovered how to use the forces of nature to create the new processes and products necessary to America's progress.

FREE: *Learn how ALLOYS, CARBONS, GASES, CHEMICALS, and PLASTICS improve many things that you use. Ask for "Products and Processes" booklet XH.*

UNION CARBIDE
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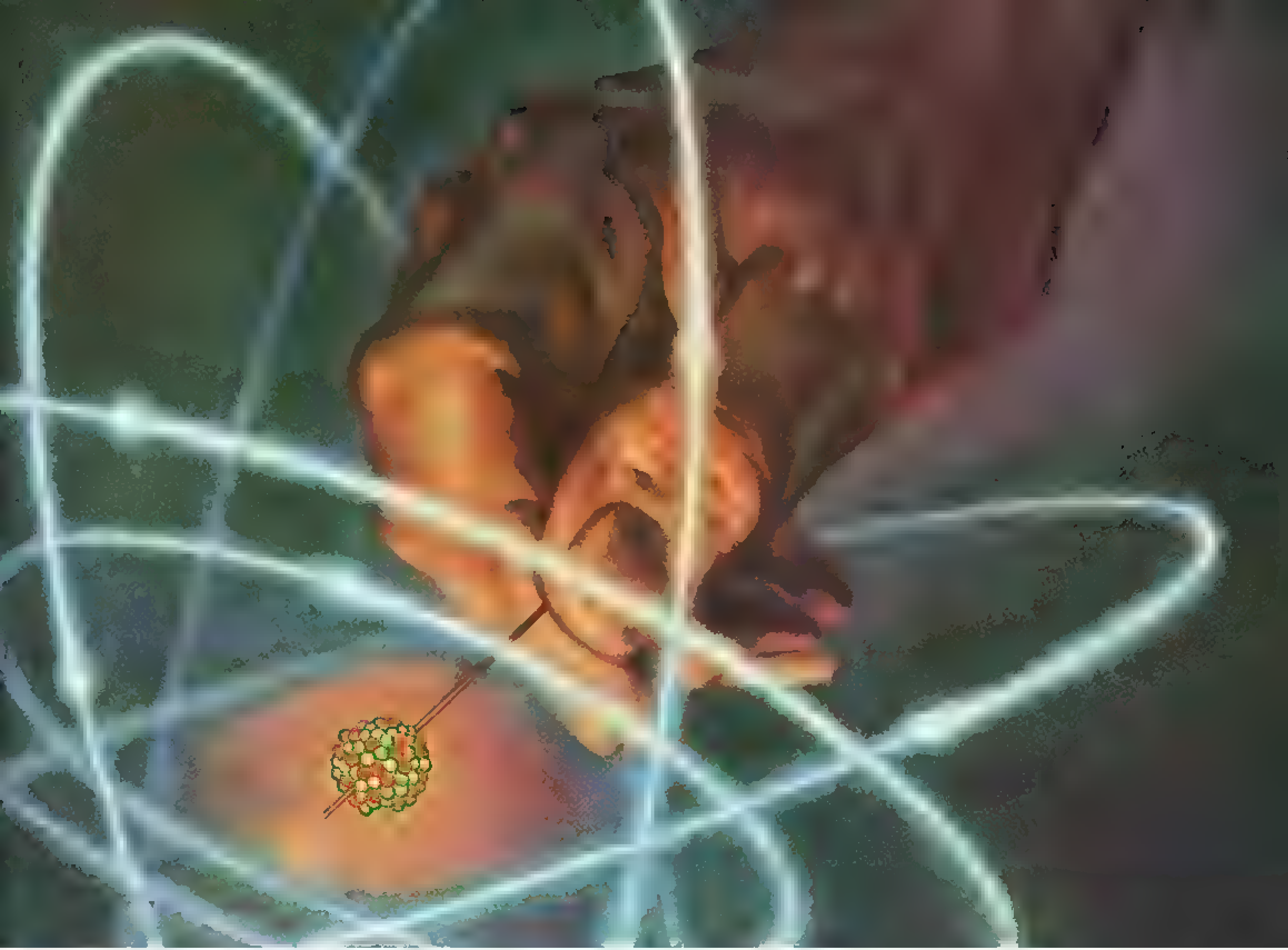
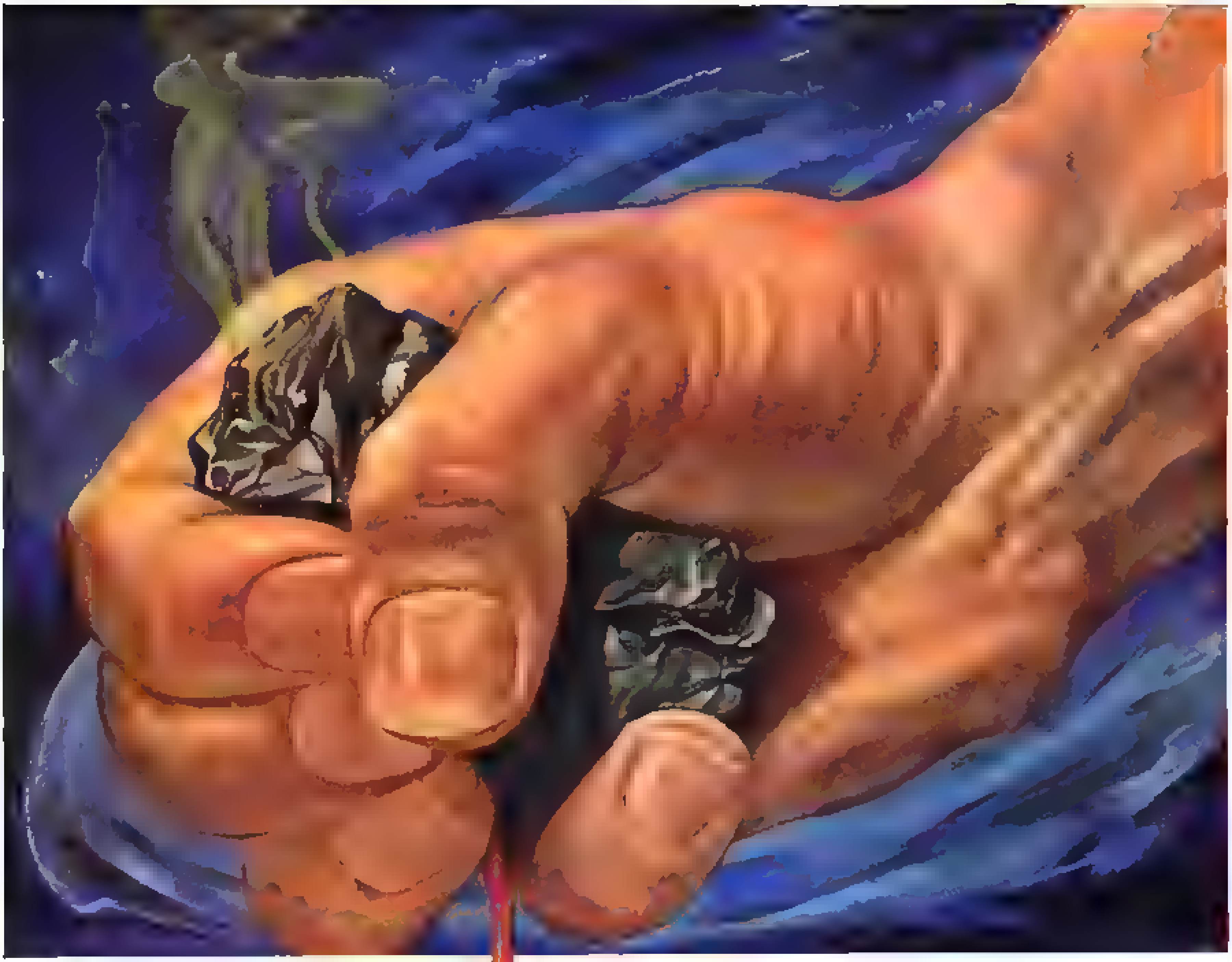
Dynel Textile Fibers
PRESTONE Anti-Freeze
UNION Carbide
LINDE Silicones
EVEREADY Flashlights and Batteries
PYROFAX Gas
BAKELITE, VINYLITE, and KRENE Plastics
LINDE Oxygen



. . . a hand in things to come

Probing the atom...for you



Men, chemistry, and coal!

Science has found a new way to get valuable chemicals from coal

Coal has long been one of man's most useful servants. Now it holds promise of even greater benefits to all of us.

COAL INTO CHEMICALS Science has at last found a practical way to convert coal into the host of valuable chemicals that nature locked into it.

The people of Union Carbide have developed a way to bring coal and hydrogen gas together under carefully controlled heat and pressure. In minutes, this revolutionary process—called *coal hydrogenation*—converts the coal into a mixture of gases and liquids that are rich in useful chemicals.

A WEALTH OF RAW MATERIALS—Among them are hitherto scarce, and even completely new, chemicals. Some are raw materials for plastics and synthetic rubber, or are vital to medicine and vitamins. Some are valuable in rocket propulsion. Others are necessary in insecticides, surface coatings, and many other important uses.

A NEW SOURCE OF SUPPLY Today, Union Carbide's coal-hydrogenation process promises steady and vastly increased production of chemicals for these needed materials. What's more, it will provide a host of chemicals that may become the basis of many new products.

A UCC ACHIEVEMENT—With the first coal-to-chemicals plant of its kind now in operation, the people of Union Carbide are well on the way to making abundant coal a source of chemicals important to us all.

FREE: *If you would like to learn more about Union Carbide's exciting new coal-hydrogenation process, write for the illustrated booklet, "Chemicals from Coal." Ask for booklet XA.*

UNION CARBIDE
AND CARBON CORPORATION
30 EAST 42ND STREET UCC NEW YORK 17, N. Y.

UCC's Trade-marked Products of Alloys, Carbons, Chemicals, Gases, and Plastics include

SYNTHETIC ORGANIC CHEMICALS • BAKELITE, KRENE, and VINYLITE Plastics • LINDE Oxygen • DYNEL TEXTILE FIBERS
ELECTROMET Alloys and Metals • HAYNES STELLITE Alloys • PREST-O-LITE Acetylene • PYROFAX Gas
EVEREADY Flashlights and Batteries • NATIONAL Carbons • ACHESON Electrodes • PRESTONE and TREK Anti-Freezes

PHOTO, COURTESY OF
AMERICAN MUSEUM OF NATURAL HISTORY

So... you wouldn't hurt a fly!

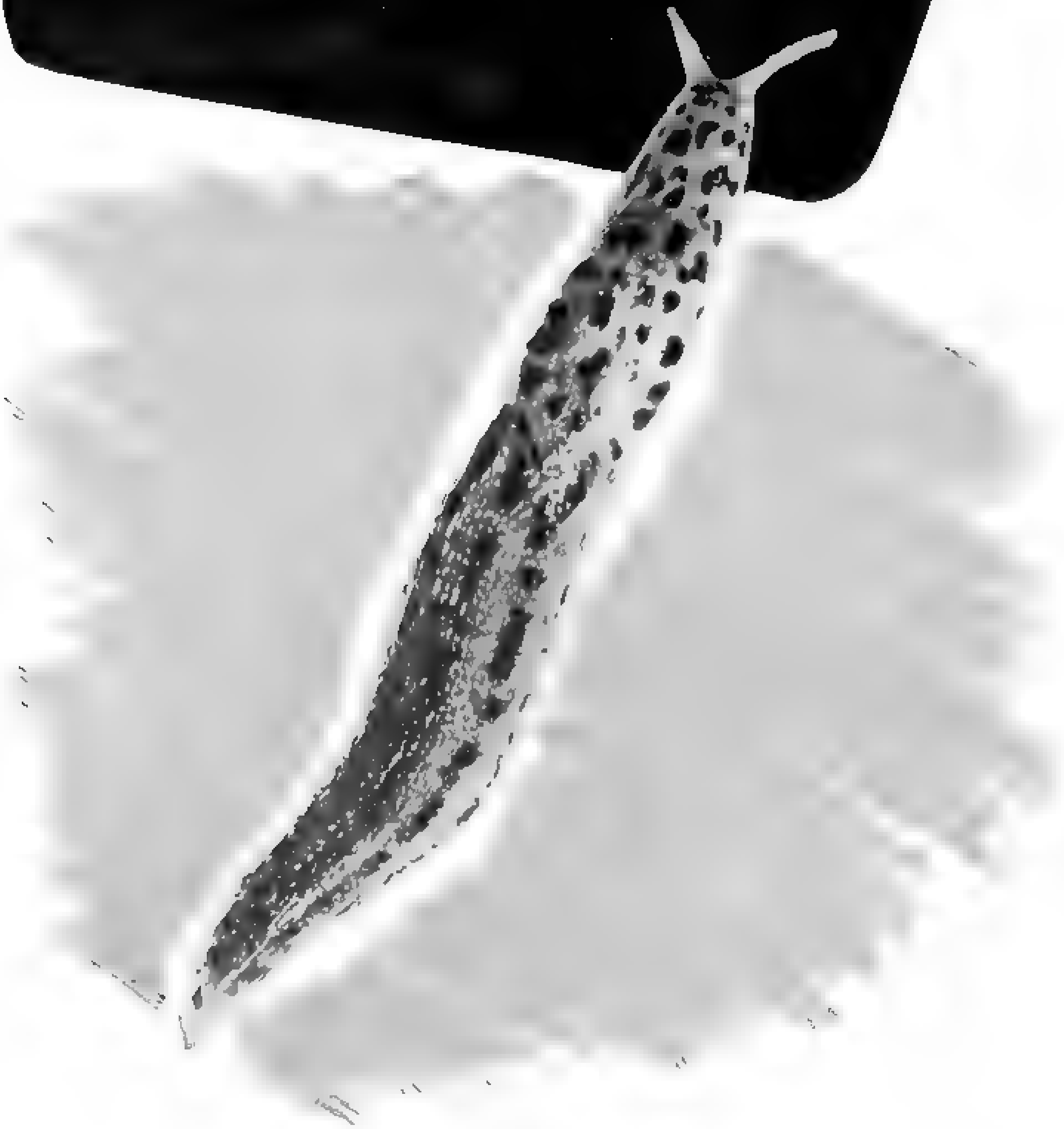
Only a little fly, you say?

Yes . . . but what a dangerous monster! He can carry polio, and many other horrible disease germs, *right into your home!*

Don't give him an even break! Fight him! Kill him and many other insect pests with these superior Knox-Out DDT household insecticides!

THEY'RE MADE by Pennsalt, a reliable 98-year-old chemical company and a pioneer in DDT, and other insecticides.

LAND SLUGS AND SNAILS and their control



Farmers' Bulletin No. 1895

U. S. DEPARTMENT OF AGRICULTURE

Which Comes First—The Hen or the Egg?

in Chemical Research, the Old Question Still Holds—

Should industry make the first move and ask the chemist to find a chemical product to meet a commercial need? Or, should the chemist discover new chemicals, by pure research, and then ask industry to find uses for them?

In the case of Atlas, the answer is "Both." And in Atlas Research both the "hen" and the "egg" come first.

These dual research activities make Atlas the source of supply for a list of products that often sound like strange bedfellows.

The Atlas Family includes commercial explosives that are at work, mining, quarrying, and aiding in building roads, aqueducts, dams, and every other type of construction

Another member of this versatile Family busies itself producing Zapon finishes and coated fabrics which give beauty and utility to products as wide apart as radio cabinets and women's handbags, laundry rolls and upholstery

Still another—Darco, the activated carbon has built its reputation for improving production technique by removing unwanted odors, colors, tastes and impurities from an immense variety of daily necessities that range from drinking water, sugar and other foodstuffs to cleaning solvents and processing chemicals.

And now, the latest news in Atlas industrial chemicals is the hundred and more Hexitol derivatives that are already bringing improvement to numerous fields including dietary foods, paper, adhesives and cosmetics.

Whether the ideas incubating in your mind call for Industrial Chemicals, Finishes, Coated Fabrics, Specialized Commercial Explosives or Activated Carbons, Atlas' past or future Research may furnish the answer.

We would like to have the opportunity to put our heads together.

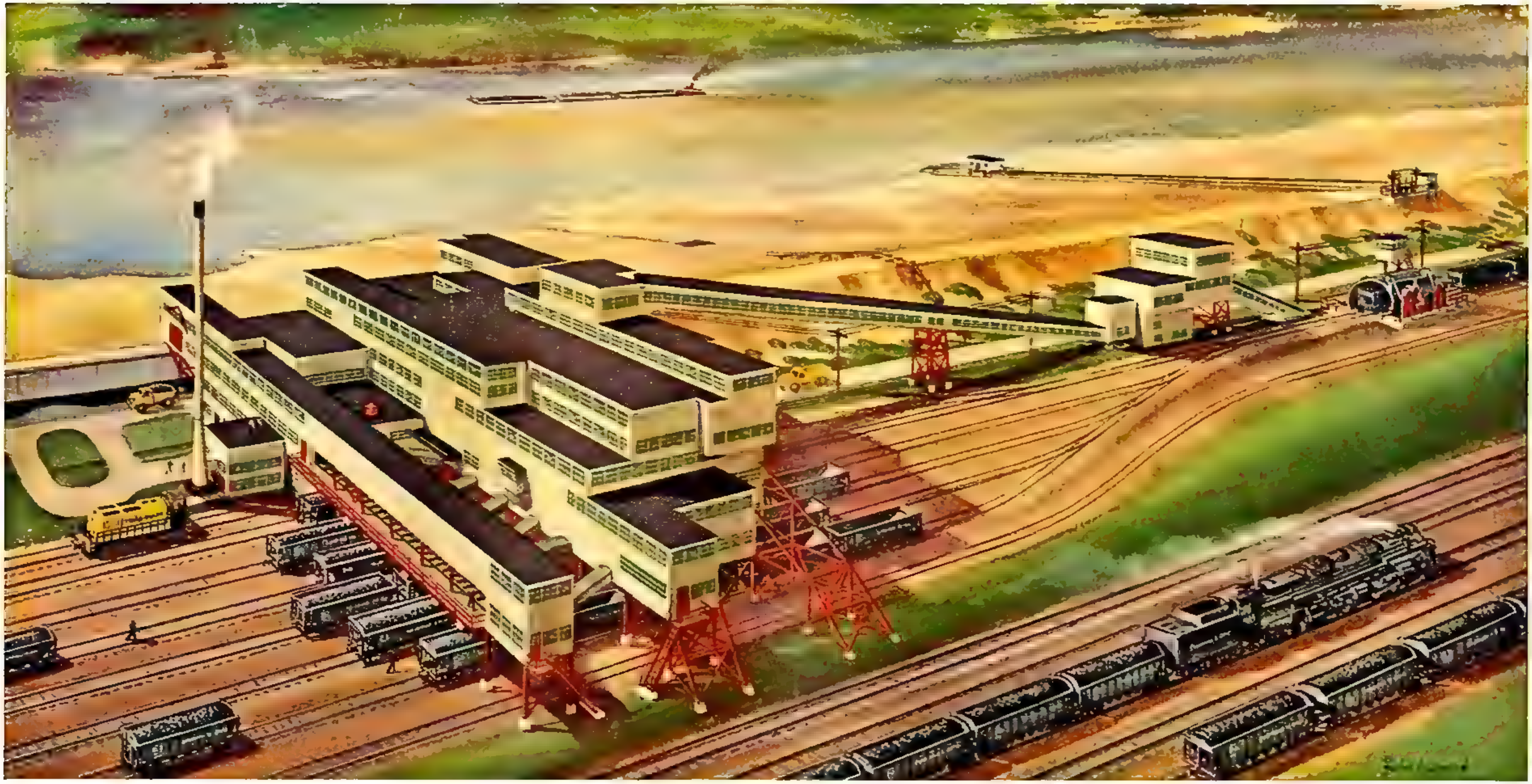
ATLAS POWDER COMPANY, WILMINGTON, DELAWARE
Offices in Principal Cities

Chemicals behind a world of products

The ATLAS Family

DARCO . . ATLAS . . ZAPON

Commercial Explosives - Industrial Chemicals - Finishes
Coated Fabrics - Activated Carbons



Truax-Traer Coal Company Preparation Plant located on the Ohio River at Ceredo, West Virginia

Huge Central Cleaning Plant

UP-GRADES COAL TO METALLURGICAL QUALITY

You are looking at a central coal cleaning plant which is located at some distance from the several mines where the coal is mined.

Run-of-mine coal from these mines converges here and is processed into uniform metallurgical coal for coking purposes and also steam coals for domestic uses. These coals are automatically loaded on river barges for delivery to steel mills and on rail cars for delivery to inland users.

This plant processes 800 tons per hour. It is the fourth and largest coal preparation plant of Truax-Traer, embodying the new idea of a central cleaning plant to mass process the output of a number of mines.

There are many new laborsaving, profit-increasing features about this plant which our technical staff will be glad to explain to you.

Note: Please forgive us when we ask you to swing the book sufficiently to see and read about this huge plant. Coal preparation plants have grown to such mammoth proportions these days that a page is hardly large enough to illustrate them adequately.

McNALLY PITTSBURG
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation—*Manufacturing Plants:* Pittsburg, Kansas • Wellston, Ohio
Engineering & Sales Offices: Pittsburg, Kansas • Chicago (1), Ill. • Pittsburgh (22), Penna. • Wellston, Ohio • Caixa Postal 1310, Rio de Janeiro, Brazil

A Georgia-Pacific "new dimension" in construction

THEY MOLD 'EM MONOLITHIC DOWN IN TEXAS

Here's a strip tease that'll make your eyes pop out . . . that is, if you go for figures.

Down Texas way recently they stripped the last forms off just about the finest monolithic structure in the U. S. It's the Thomas J. Lipton, Inc. building at Galveston, where clean lines and a smooth exterior bear mute testimony to the efficiency of GPX Plastic-faced Plywood.

Walls, floors and ceilings are all concrete . . . poured in forms of GPX . . . to create, from movable molds, a one-piece structure. Thanks to the satin-smooth, armor-hard surface of GPX, ceilings "set" so smoothly that no plastering was needed. Costly hand finishing was virtually eliminated.

In all, 200,000 square feet of surface area was poured in 32,000 square feet of GPX. And the same panels continued to make still further savings for the contractor on his next job.

Other grades of Georgia-Pacific's Plastic-faced Plywood are helping to cut costs and do a better job in countless industrial applications. If you have a job where smoothness, lightweight strength and ruggedness pay off, send for this new folder on GPX—*write Georgia-Pacific Plywood Company, 660 North Capitol Way, Olympia, Wash., or get in touch with your nearest Georgia-Pacific office.*

G-P

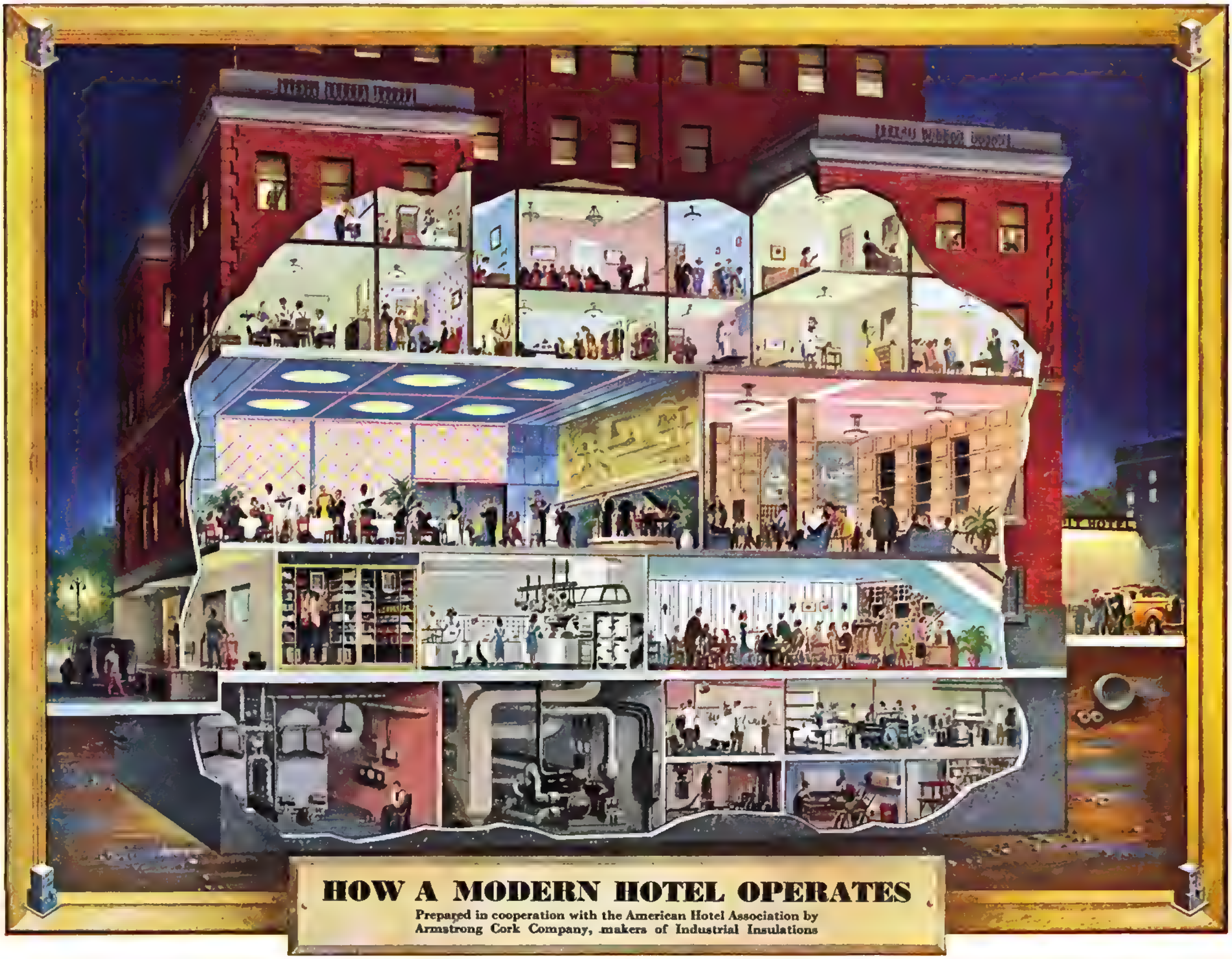
GEORGIA—PACIFIC

PLYWOOD COMPANY

OFFICES OR WAREHOUSES IN: Augusta, Birmingham, Boston, Chicago, Columbia, Louisville, Memphis, Nashville, Newark, Olympia, Orlando, Philadelphia, Pittsburgh, Portland, Raleigh, Richmond, Savannah

Oct 1951

DOUGLAS FIR PLYWOOD • HARDWOOD PLYWOOD • GPX • SOUTHERN & WESTERN LUMBER • DOORS



HOW A MODERN HOTEL OPERATES

Prepared in cooperation with the American Hotel Association by Armstrong Cork Company, makers of Industrial Insulations

When you look behind the scenes, a modern hotel is an astounding place. Few guests appreciate that their comfort demands such a complex and highly mechanized institution. The men 1 who ordered ice probably don't know that there's a complete ice-making plant 12 hidden away in the basement. The dancers in the ballroom 5 don't stop to think what it takes to provide air conditioning 11.

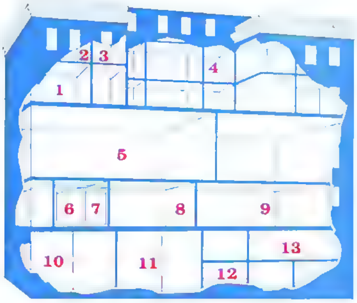
Touch a spigot 2 and ice water spurts out. Turn a valve 4 and heat is waiting. Heat and cold flow through the hotel like lifeblood in its veins. Insulation on the pipes makes it economically possible to put heat and cold where they are needed. Without insulation, ice water would not stay cold; steam would not stay hot. Armstrong makes and installs such materials—and many other insulations that play an important part in the services of a modern hotel.

Freshly laundered sheets 3 require steam and hot water in the laundry 13. Both were generated in a boiler 10 that is lined with Armstrong's Insulating Brick and piped through lines covered with asbestos or magnesia insulation. The roof above that same room 3 is insulated with Armstrong's Temlok, shielding guests from summer heat.

The chef's special in the coffee shop 9 today was tastefully fresh filet of sole. It came from the freezer room 7. Served with it was new asparagus from the chilled storage room 6. Walls, floors, and ceilings of both rooms are constructed with Armstrong's Corkboard. The salad was crisped in the chef's big refrigerator 8 which was built—just like so many of the best home refrigerators—with an Armstrong insulation.

For more than forty years, the Armstrong Cork Company has been manufacturing, engineering, and installing insulating materials. Oil refineries, rayon plants, cold storage warehouses, steel mills, dairies, truck body builders, meat packing plants, and hundreds of other industries depend upon Armstrong's Industrial Insulations. If you have a problem in keeping heat or cold where it belongs, there's a trained engineer in a near-by Armstrong district office who will be glad to help you in any way.

SEND FOR ART PRINT... Enlargement of above picture, in full color, 21" x 22", ready for framing. No charge. Just write Armstrong Cork Company, Building Materials Division, 4707 Marietta Ave., Lancaster, Pa.



Temlok is a registered trade-mark.

ARMSTRONG'S INDUSTRIAL INSULATIONS

MATERIALS · INSTALLATION

FOR ALL TEMPERATURES FROM 300° F. BELOW ZERO TO 2800° F.

. . . a hand in things to come

Unlocking the secrets of the universe

Amazing textile fibers spun out of natural gas . . . wonder drugs squeezed from coal . . . shining stainless steel forged from drab, brownish earth. These man-made marvels were born in the minds and hands of research scientists.

Never satisfied with things as they are, the research scientist takes apart the raw materials of nature to capture the basic "building blocks" of the universe. Then he rearranges and combines the pieces into new and better things that help improve our lives.

Research is a living thing to the people of Union Carbide—for it is the foundation upon which their work is built. They have created hundreds of useful products from such basic substances as oil, natural gas, ores, air, and water. And the wonders yet to come, the completely new things of tomorrow, are being sought and found in Union Carbide's laboratories today.

Learn about the exciting work going on now in carbons, chemicals, gases, metals, plastics, and nuclear energy. Write for "Products and Processes" Booklet A, Union Carbide Corporation, 30 East 42nd St., New York 17, N. Y. In Canada, Union Carbide Canada Limited, Toronto.

UNION CARBIDE

. . . a hand
in things to come

ALTEC PLAYBACK and speech-input equipment

for recording and broadcast studios

. . . a hand in things to come

Complexion care for apples

Apples and peaches are the most tempting when they look best. Yet all season long, fruits are exposed to attack from hungry insects that can stunt growth and leave ugly blemishes on the surface. This battle of the bugs is now being won with the remarkable CRAG insecticide called SEVIN. Highly effective against a wide range of insects, it helps fruit trees produce a crop with healthful beauty that is more than skin deep.

Many modern chemicals are used to do the work for you on the home garden front, too. A complete line of garden products is available under Union Carbide's well-known EVEREADY trade-mark. There are dusts to keep delicate roses or tomatoes free from destructive bugs or fungus . . . weed killers that put an end to a back-breaking chore . . . and an all-purpose aerosol insecticide that has a lethal effect on insects in the garden or inside the house.

The people of Union Carbide are continuing their research to develop more of the products that help enrich your everyday life.

The terms "Crag," "Sevin" and "Eveready" are registered trade-marks of Union Carbide Corporation

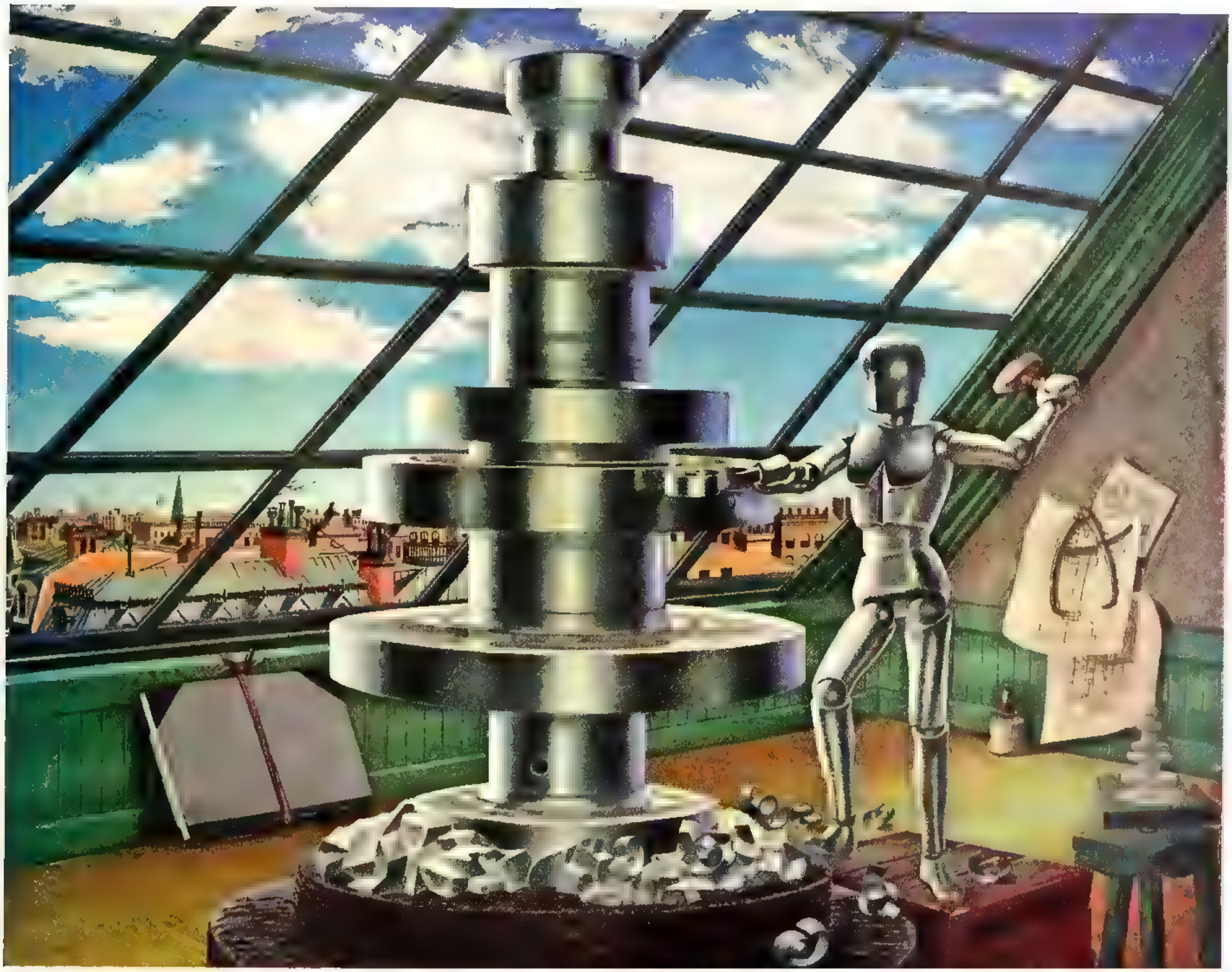
Learn about the exciting work going on now in carbons, chemicals, gases, metals, plastics, and nuclear energy. Write for "Products and Processes" Booklet D, Union Carbide Corporation, 30 East 42nd Street, New York 17, N.Y. In Canada, Union Carbide Canada Limited, Toronto.

UNION CARBIDE

...a hand
in things to come

Si
P
Al
Cr
52.01
Sc
44.96
32 Ge
72.60
74.91
Se
78.96
31
Zr 40
91.22
Nb 41
92.91
Mo
95.95
Tc 43
51 Sb
121.76
52 Te
127.61
53
50 Sn
118.70
49 In
Ta 73
180.95
W 74
183.85
Re 75
186.31
83 Bi
84 Po
85 At

Spark of genius



JONES & LAMSON MACHINE CO., big name in industry, designs and builds precision machine tools. Shell Industrial Lubricants meet varied requirements in this manufacturer's complex operations.

"AUTOMATIC SCULPTOR"...works in steel

FEED the toughest steel to a Jones & Lamson machine tool—in whirlwind time it "carves out" the finely finished parts needed to make *other* machines . . . such as automobiles, planes, diesel engines.

Since the work they do is measured in thousandths of an inch, these J&L machine tools must pass minute inspection—leave the plant and reach the user in flawless condition.

The choice and use of the right industrial lubricants is important. Jones & Lamson engineers, for each specific need, select the best available oils and greases. Some of their most exacting requirements are met by Shell Industrial Lubricants.

Shell Tellus Oil is used in vital hydraulic mechanisms, in gear boxes, and is shipped out with finished machines. Shell Ensis Oil is used as a rust preventive. Shell Aspa Oil is used in heat treating machine parts.

Development of better industrial lubricants is only one way in which Shell demonstrates leadership in the petroleum industry, and in petroleum products. Wherever you see the Shell name and trade mark, Shell Research is your guarantee of quality.

SHELL

Shell Research leads
to finer Products —
more for your money

© 1951, SHELL OIL COMPANY

Wasp Nest
IN EAST HARTFORD

PRATT & WHITNEY AIRCRAFT, world's biggest aircraft engine builder, turns out power plants for many types of planes. Shell [illegible]

Although Pratt & Whitney's aircraft engines – the famous Wasp line – produce thousands of horsepower, individual parts are machined like a multi-jeweled watch.

Noted for durability, these engines have earned the right to a top position in aviation through long service life. One reason for this is *care*, an example of which is the protection Pratt & Whitney gives Wasp Major piston engines during testing and run-in. A product of Shell Research, AeroShell Oil 100, is used in this vital step with these engines.

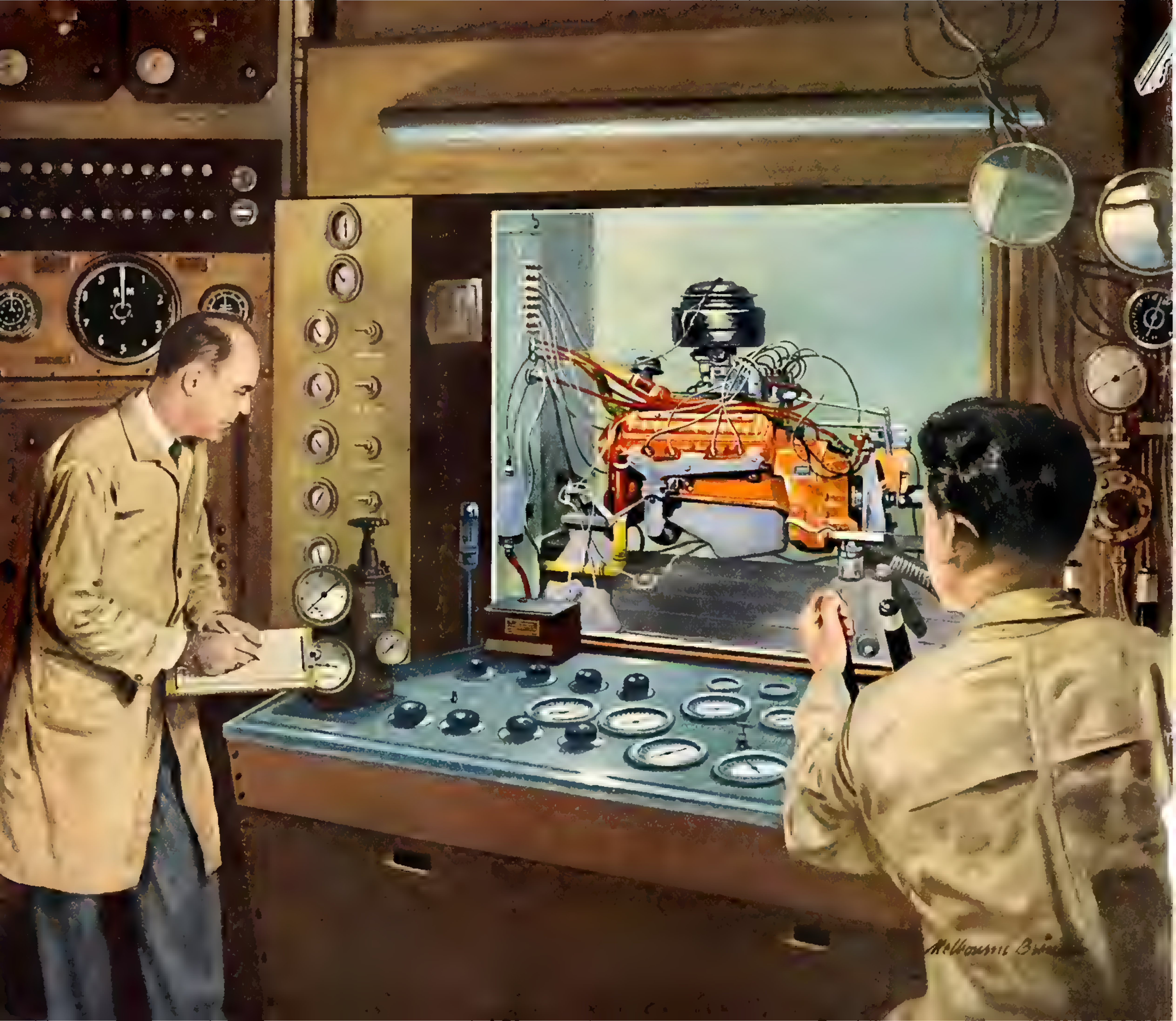
Reason for this choice is the stability and uniformity of AeroShell Oil, qualities of especial importance during the run-in of a new engine. In addition to P&W's own strict standards, AeroShell Oil 100 must also meet severe specifications set by other users—all of whose tests it has consistently passed with top ratings.

Development of finer aviation lubricants is only one evidence of Shell leadership in the petroleum industry. Shell Research is your assurance of better quality—*more for your money*—when you buy products bearing the Shell name and trade mark.

SHELL

Shell Research leads to finer Products – *more for your money*

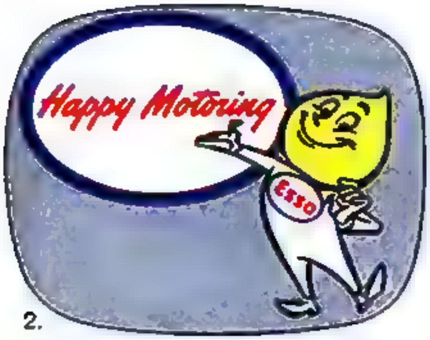
© 1952, SHELL OIL COMPANY


Melbourne Brin

Meet Happy!

(HE'S THE NICEST THING THAT EVER HAPPENED TO YOUR CAR)

1.
"Happy" is no ordinary oil drop. He's an oil drop with a mission.



2.
He's Esso's cheerful symbol of Happy Motoring.

3.
He tries to do what his name implies: Bring Happy Motoring to millions.

4.
He works with your Esso Dealer to bring you fine products and services.

5.
You count on him for outstanding gasolines and motor oils. And that's not all!

6.
He stands for all the helpful services you expect! Like cleaning your windshield...

7.
He helps to make sure the oil, water and battery are in tip-top shape.

8.
He even knows how clean and tidy restrooms make you "feel at home".

9.
He's "on duty" at Esso Dealer Stations everywhere. There's one near you.

10.
In fact, Happy Motoring is one big reason why the Esso Sign is "World's 1st Choice!"

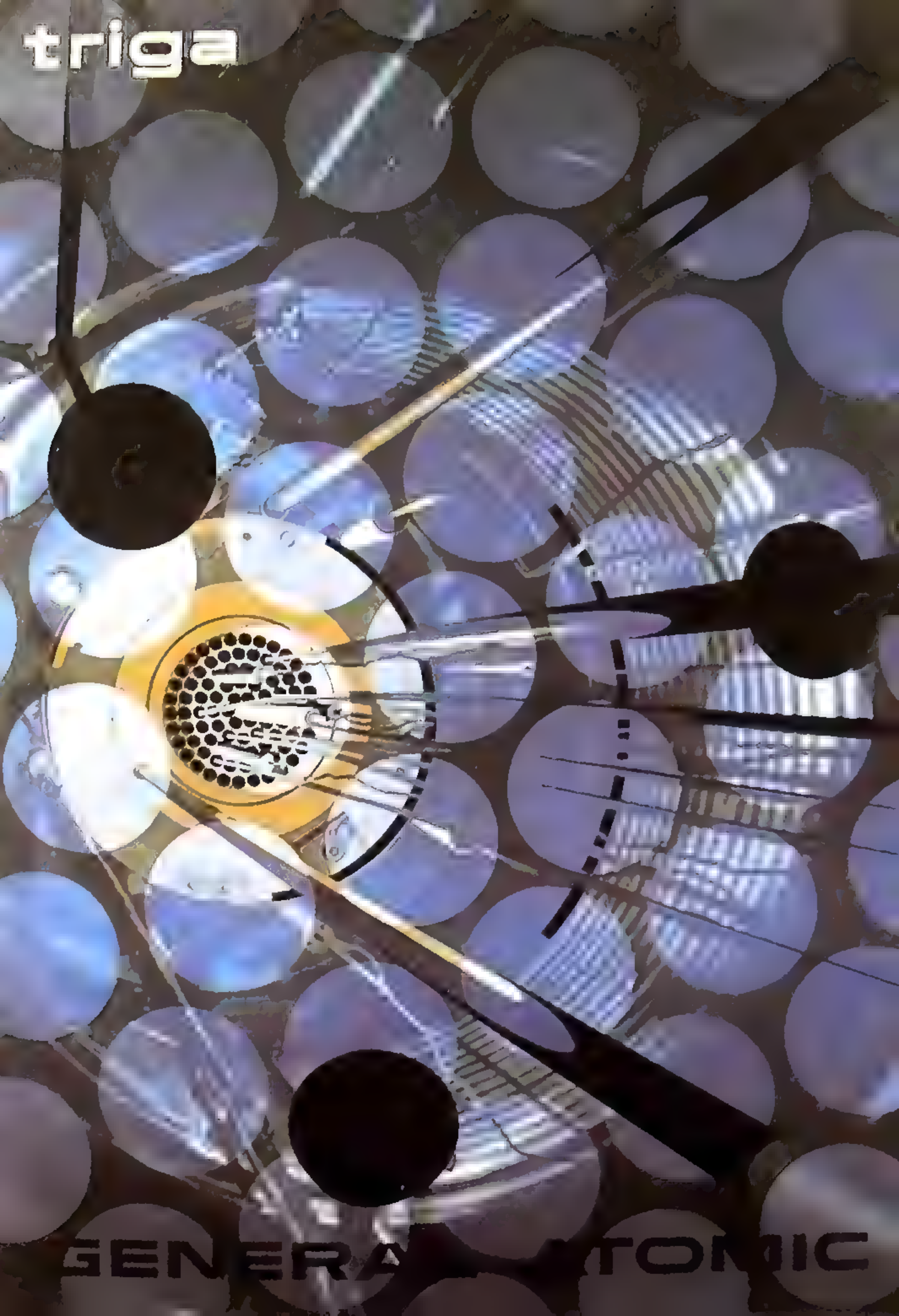
ESSO STANDARD • DIVISION OF HUMBLE OIL & REFINING COMPANY

ATOMIC POWER

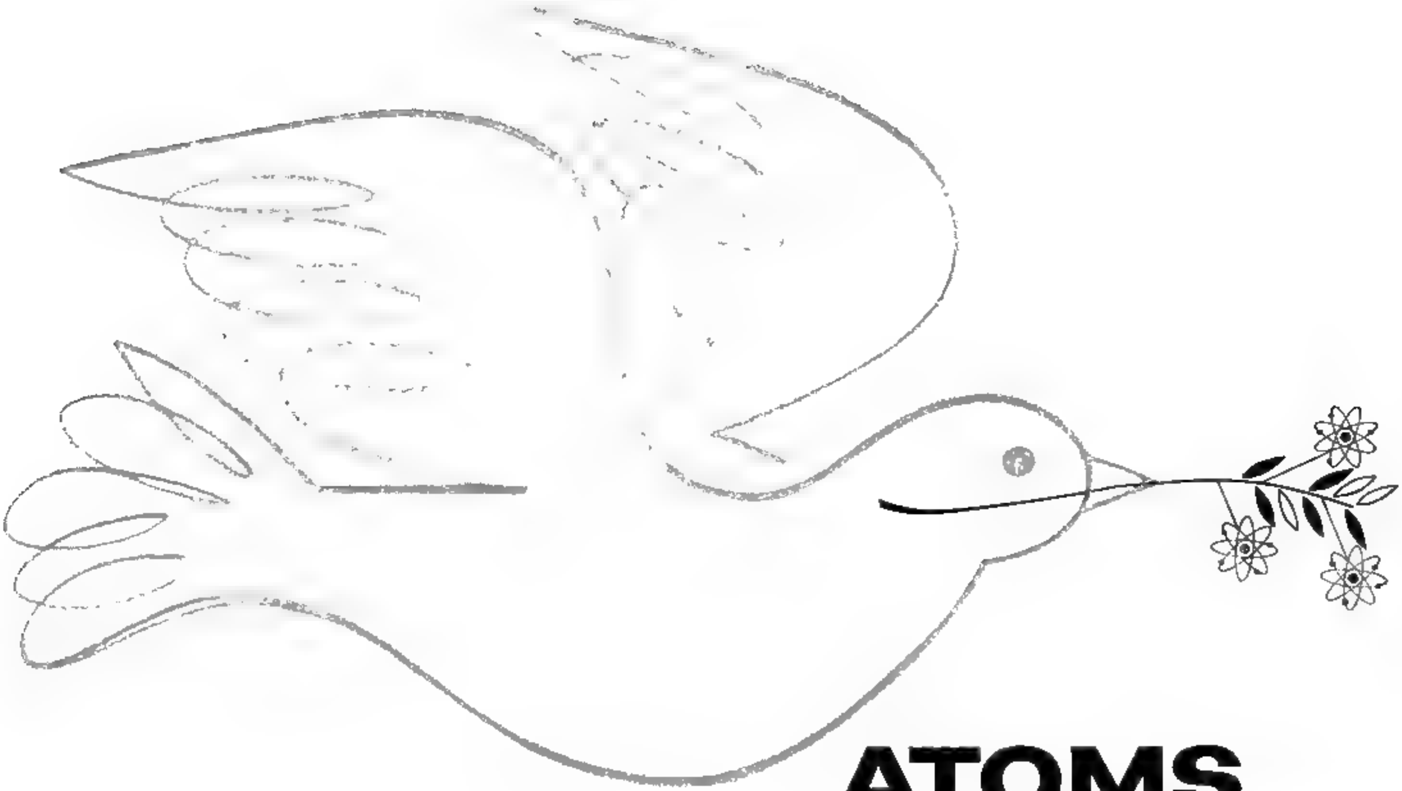
TODAY, THE INVESTOR-OWNED POWER AND LIGHT COMPANIES ARE PARTICIPATING IN SEVENTEEN ATOMIC POWER PLANT PROJECTS, EITHER IN OPERATION, UNDER CONSTRUCTION OR IN VARIOUS STAGES OF PLANNING.

DELTA
DC 8
DELTA AIR L
Coca-Cola

triga



GENERAL ATOMIC



ATOMS FOR PEACE

Lockheed, always in the forefront of aeronautic and scientific achievement, now extends its leadership into a significant new field—Nuclear Energy for the World's Work.

For eight years, Lockheed's nuclear scientists, physicists and engineers have been working on the development of a nuclear-powered airplane. Now, these scientists are also ready to put the atom to work for industry—with research and process heat reactors, food irradiation facilities and the applications of radioisotopes.

At Dawsonville, Georgia, Lockheed will begin operating the Georgia Nuclear Laboratories later this year. This new installation will provide the largest radiation effects research capability in the United States.

LOCKHEED MEANS LEADERSHIP

LOCKHEED NUCLEAR PRODUCTS

MARIETTA, GEORGIA

Operated by the Georgia Division
Lockheed Aircraft Corporation

SERVING INDUSTRY . . . SERVING AMERICA

You are always close to Continental Can with its 65 plants in the United States, Canada and Cuba, 17 field research laboratories and 63 sales offices.

INVENIEMUS VIAM AUT FACIEMUS: "We shall find a way or we shall make one."
– Memorial Gate, University of Pennsylvania

Investing in young America... a progress report

"To HELP deserving young men and women obtain a college education . . . to give financial support to a cross-section of American colleges . . ."

FOUR YEARS AGO, the Union Carbide Scholarship Plan was established with those objectives.

Today, the plan provides the complete cost of tuition and fees for 400 four-year scholarships at colleges and universities throughout the country. As an important part of their education, the scholars are encouraged to gain valuable experience in their chosen fields by obtaining jobs in industry during summer vacation.

50 TECHNICAL SCHOLARSHIPS are also available in specific fields of study. They cover the student's tuition and fees for the senior year. In addition, to assist graduate students and to support academic research, Union Carbide offers 66 fellowships and grants-in-aid to universities.

THE PEOPLE OF UNION CARBIDE regard these scholarships as an important contribution to the future and to two of America's priceless assets—its educational system . . . and its youth.

TO LEARN MORE *about the Union Carbide undergraduate scholarships and the colleges and universities in which they have been established, write for Scholarship Plan booklet A.*

UNION CARBIDE
AND CARBON CORPORATION
30 EAST 42ND STREET UCC NEW YORK 17, N. Y.
In Canada: UNION CARBIDE CANADA LIMITED, Toronto

UCC's Trade-marked Products include

LINDE Oxygen
PYROFAX Gas
PREST-O-LITE Acetylene
EVEREADY Flashlights and Batteries
SYNTHETIC ORGANIC CHEMICALS
ELECTROMET Alloys and Metals
NATIONAL Carbons
PRESTONE Anti-Freeze
HAYNES STELLITE Alloys
ACHESON Electrodes
UNION Carbide
UNION CARBIDE Silicones
Dynel Textile Fibers
BAKELITE, VINYLITE, and KRENE Plastics

The sun that never sets

For years, movie makers have relied on the powerful carbon arc to light their motion picture studio sets. It gives them brilliant, man-made "sunlight" for use when and where it is needed.

Recently, Union Carbide—a pioneer in carbon-arc lighting—perfected a new yellow flame carbon arc for use in color photography. It gives off a perfectly balanced light which brings out true colors on today's sensitive film. This development has been recognized by the award of an "Oscar," symbol of highest achievement in the motion picture industry.

But the carbon arc is not limited to studio lighting alone. Its intense beam is also used to project the tiny picture on the film to the breathtaking realism and depth you see on theatre screens.

Many more uses of this amazing light have been developed—duplicating the effect of sunlight on new paint and textile colors . . . or analyzing the basic composition of a great many different materials. The scientists of Union Carbide will continue their research efforts to find new and better ways to make carbon serve all of us.

FREE: *Learn how Union Carbide products and research help satisfy basic human needs. Write for "Products and Processes" booklet XK.*

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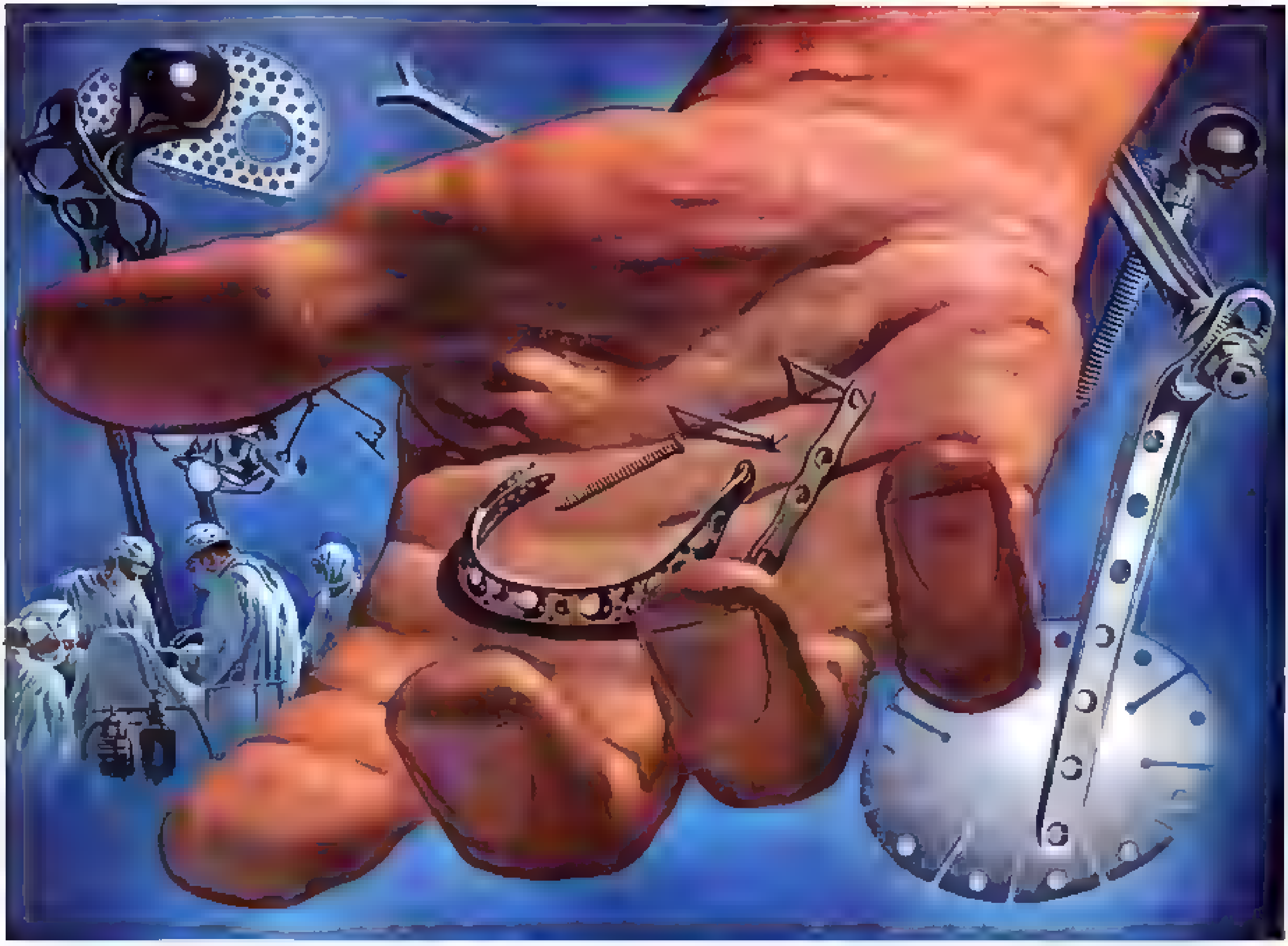
UCC's Trade-marked Products include

NATIONAL Carbons PREST-O-LITE Acetylene SYNTHETIC ORGANIC CHEMICALS ELECTROMET Alloys and Metals
PRESTONE Anti-Freeze LINDE Oxygen HAYNES STELLITE Alloys Dynel Textile Fibers EVEREADY Flashlights and Batteries
BAKELITE, VINYLITE, and KRENE Plastics PYROFAX Gas UNION Carbide UNION CARBIDE Silicones CRAG Agricultural Chemicals



These . . . may become part of you

Bones, tissues, and even complex joints are now being strengthened or replaced with "friendly" metals

Everyone prefers the healthy flesh and blood that nature gave him. But sometimes parts of our bodies weaken or fail—and life itself may be threatened.

DOCTORS NEEDED "FRIENDLY" MATERIALS—Surgeons, seeking materials that could replace or strengthen fractures or weakened parts of the body, found that certain alloy metals are "friendly" to flesh and bone. They neither irritate nor harm the surrounding tissue.

Special alloy metals that are strong, enduring and non-corrosive are good examples.

NEW PARTS FOR OLD—When used to replace broken joints or to strengthen damaged bone, these metal parts usually do an astonishing job of fitting right in with the body's functioning. As a result, many persons who might otherwise be bed-ridden or crippled are now leading normal lives.

In other cases these metals are used as plates to replace parts of the skull, and as "screens" to reinforce tissue that has become weakened or torn.

UCC SERVES MEDICINE AND INDUSTRY—Creating and producing more than 50 different alloys that go into metals to serve medicine and nearly every field of industry is one of the many important jobs of the people of Union Carbide.

FREE: *Learn more about the interesting things you use every day. Write for the illustrated booklet "Products and Processes." It tells how science and industry use the* ALLOYS, CARBONS, CHEMICALS, GASES, *and* PLASTICS *made by Union Carbide. Ask for booklet G.*

UNION CARBIDE
AND CARBON CORPORATION
30 EAST 42ND STREET UCC NEW YORK 17, N. Y.

UCC's Trade-marked Products of Alloys, Carbons, Chemicals, Gases, and Plastics include

ELECTROMET Alloys and Metals • HAYNES STELLITE Alloys • NATIONAL Carbons • ACHESON Electrodes • PYROFAX Gas • EVEREADY Flashlights and Batteries
BAKELITE, KRENE, and VINYLITE Plastics • PREST-O-LITE Acetylene • LINDE Oxygen • PRESTONE and TREK Anti-Freezes • SYNTHETIC ORGANIC CHEMICALS

You are awarded over 50 years world-wide experience . . .

when LUMMUS *designs, engineers and constructs your new process industry plant*

- *Six Lummus organizations circle the globe*
- *Over 50 years of world wide experience on over 850 installations for the process industries*

OCT 1960

Farm Equipment . . . *and The National City Bank of New York*

Farmers lead all industry in boosting man-hour productivity

Knowing that the United States has over 30 million more mouths to feed than in 1940, and that 2½ million farm workers have left the farms for jobs in industry, you might start fearing for our food supply. But we, as a nation, are eating better than ever. That's because mechanical miracles have been happening down on the farm. By "harnessing" more than 14 million pieces of motorized equipment, farmers have increased production nearly a third, while overcoming a labor loss of about 2 billion man-hours a year.

Recent developments in farm machinery have been so rapid that the farmer has outstripped other segments of our economy in mass-production methods. New combines harvest around 30 acres of wheat a day; a mechanical picker in one hour can harvest 2 acres of corn; milking machines save 30 man-hours per cow per year; mechanical cotton pickers do the work of 40 men, slashing picking costs.

Abroad, American farm machines are known as "hunger fighters." Since 1946, we have exported $2 billion worth of equipment.

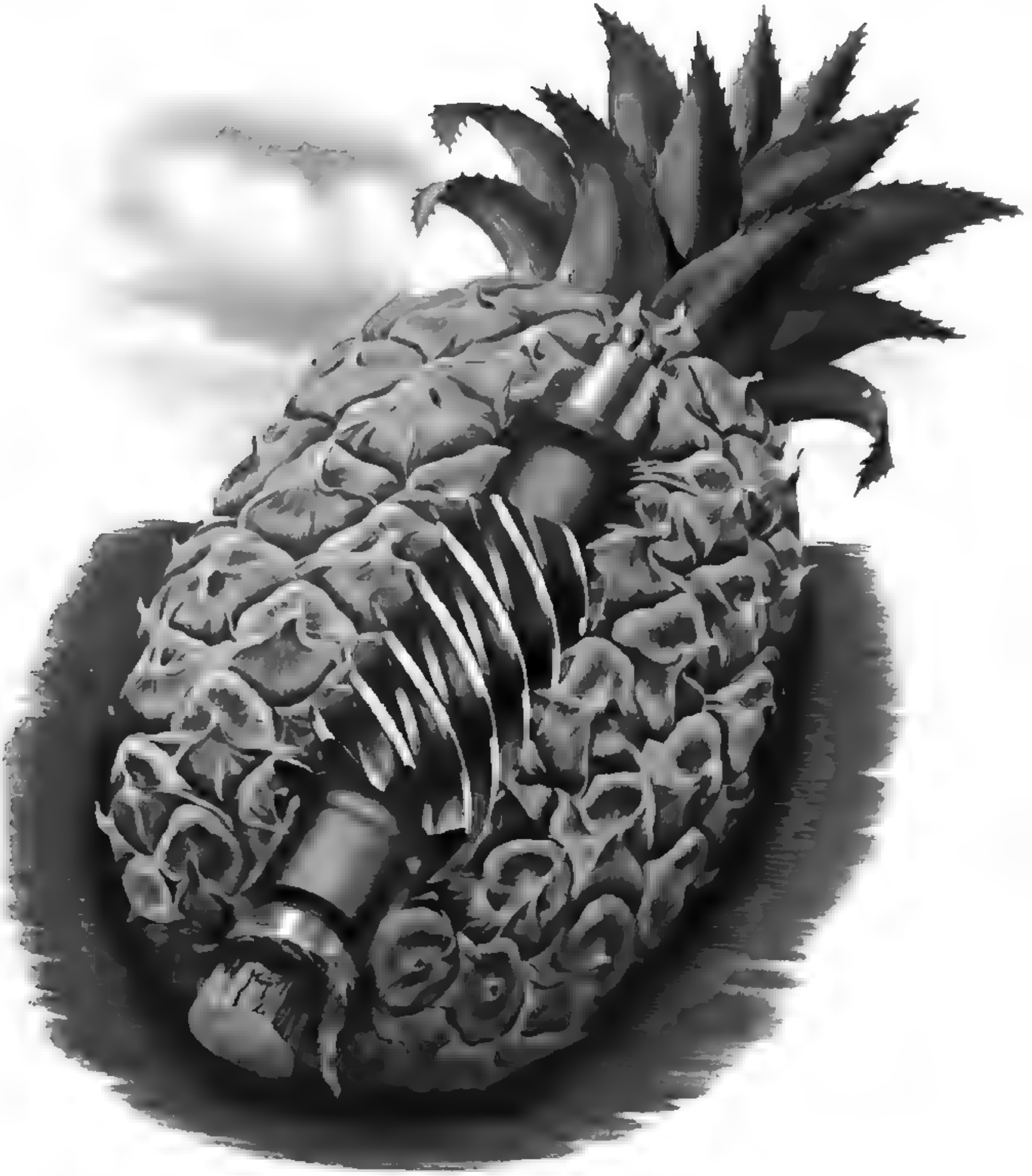
The tremendous job accomplished by the farm-equipment industry at home and abroad has needed the help of a *banker*—not just a bank. The National City Bank of New York, in cooperation with its correspondents, helps supply credit to farm-equipment manufacturers. In addition, National City's Domestic Division team of officers, made up of bankers whose training and experience qualify them as specialists in the areas and industries they serve, provides sound counsel on such complex subjects as the financing of farm-equipment distribution. The Bank's 59 Overseas Branches, plus correspondents in every major overseas market, make available to farm-equipment exporters on-the-spot financing, up-to-date credit information, and counsel on world economic conditions. This well-knit, coordinated operation assures effective financial advice and assistance through every stage of production and distribution, here and abroad.

Whether your business is national, international, or local, you can benefit from the creative financial guidance our officers provide. For more about the advantages of having a *banker* instead of just a bank, write:

The National City Bank of New York,
55 Wall Street, New York, N. Y.

Member Federal Deposit Insurance Corporation

First in World Wide Banking



FOR A STRONG, TOUGH CORE—*Nickel Steel*

For parts requiring strong, tough cores as well as hard, wear-resisting surfaces case-hardening *nickel* steels are often the best choice.

The heat treatment of suitable *nickel* steels is simpler and cheaper than for unalloyed steels of comparable strength and toughness. And because the treatment is not so drastic, cracking and distortion are less likely.

Write for a free copy of our publication, "Case-Hardening and the Use of Nickel Steels".

THE MOND NICKEL COMPANY LTD · Sunderland House · Curzon Street · London · W1

Home, home on the range!

Flying ranchers? Hedge-hopping farmers? Mister, you don't know the *half* of it!

Yes, the light plane has found a home on the range and pasture probably to a greater extent than you realize. Why, in Iowa alone, Aeronautics Association officials estimate that 8,500 farm folks are now flying! In Oklahoma and Nebraska, Texas and Montana, ranchers and farmers are using new light planes, even for "going to town" on Saturday!

Now all this doesn't necessarily mean that Old Paint is Headed For The Last Round-Up. But it does indicate that a significant new tool is being put to work by the folks who raise our food. "Twenty minutes in the plane is worth 14 hours in the saddle," is the way one rancher puts it.

In the Middle West, the airplane probably plays a bigger part in the lives of the people than in any other section of the country. And Phillips research staff long ago took the lead in developing and producing high-octane gasolines for planes. As a result of this pioneering Phillips was one of the largest suppliers of 100 octane gasoline during the war—and after the war we were the first in this territory to provide un-leaded 80-octane gasoline to private flyers and flying farmers. At small airports and large, in the Middle West, Phillips aviation products are a by-word.

Yes, all *kinds* of petroleum products play a mighty important part in the lives of America's farmers and ranchers today. Fuel for planes, sprays for livestock, lubricants for equipment—in fact Phillips has more than 100 items to sell to farm customers! It's a far cry from the "Kerosene and Axle Grease" days!

And no one knows it better than we, who have grown up in this business. Our unbounded faith in the future is based on this knowledge that the potentialities of America's greatest natural resources—petroleum—have hardly yet been realized!

PHILLIPS PETROLEUM COMPANY

Bartlesville, Oklahoma

Phillips 66

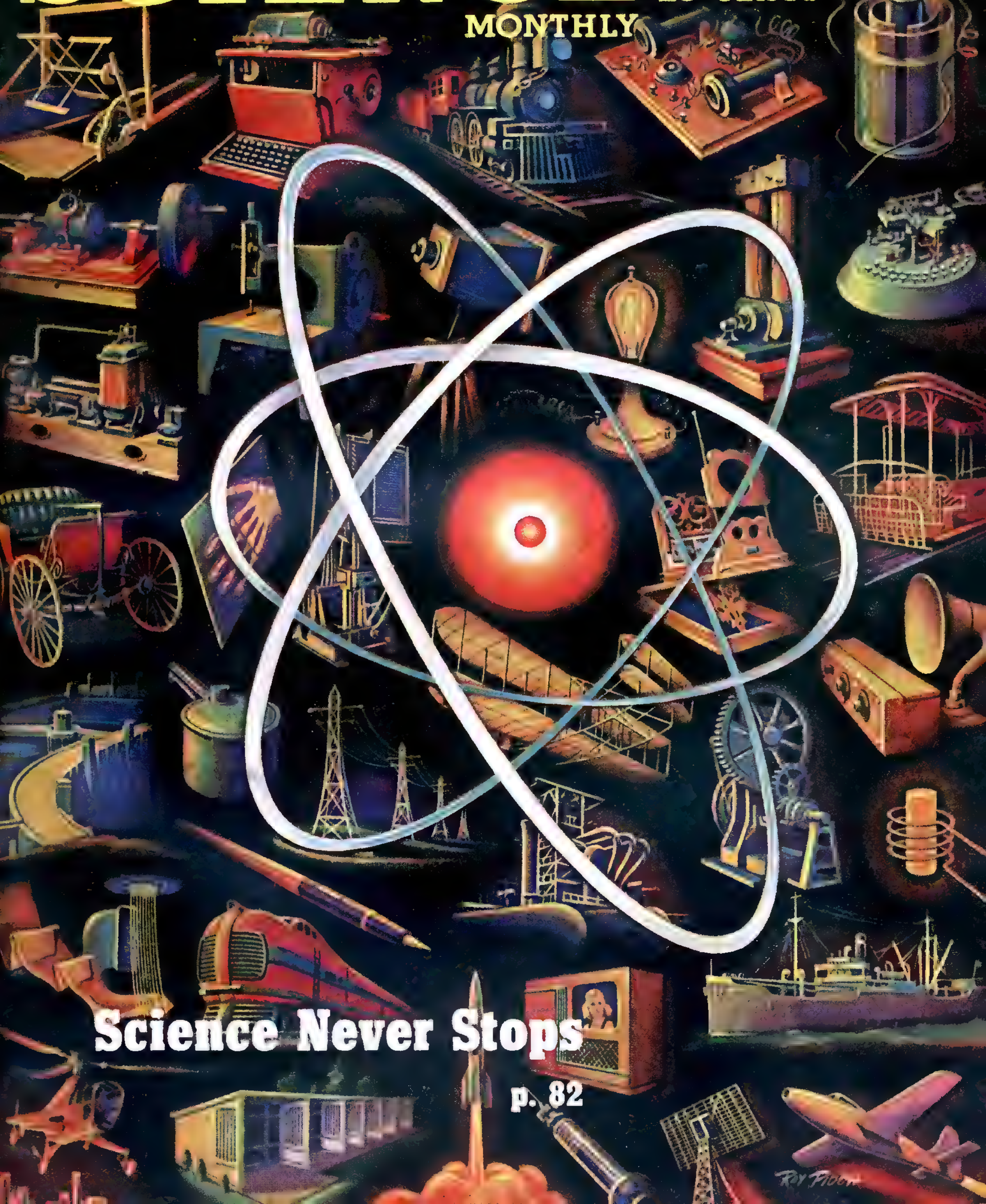
PHILLIPS 66 GASOLINES, LUBRICANTS AND ACCESSORIES FOR CARS, BUSES AND TRUCKS • FUELS, LUBRICANTS AND PRODUCTS FOR FARM AND INDUSTRY • AVIATION GASOLINE AND LUBRICANTS • NATURAL GAS • CHEMICALS • TIRES AND TUBES • WOOLAROC HOME APPLIANCES • PHILGAS • SOLVENTS • LIQUEFIED PETROLEUM GAS FOR HOMES AND INDUSTRY • RESEARCH, DEVELOPMENT AND PATENT LICENSING • DOMESTIC AND FOREIGN CRUDE OIL • ENGINEERING SERVICE FOR THE PETROLEUM INDUSTRY • CRUDE OIL PIPELINES • REFINED PRODUCTS PIPELINES • GAS PIPELINES • CARBON BLACK

oct 1946

POPULAR SCIENCE MONTHLY

75TH ANNIVERSARY ISSUE

MAY 1947
25 CENTS



Science Never Stops

p. 82

1947

Leaf Hopper AT SPEONK

YES, THE LEAF HOPPER IS THE BUG. The Hedge Hopper—the airplane—is out to get him and a billion others like him . . .

In Long Island's great potato belt, Leaf Hoppers were doing fatal damage, carrying the virus of Hopper Burn from plant to plant, leaving the fields "burned" and withering. From Speonk, Long Island, came a distress call to Shell Agricultural Scientists.

These Research men were known for their work in developing "oil base sprays" and machines to use them. As one assignment, they had conducted the largest controlled experiment on record, fighting another variety of Leaf Hopper on 15,000 priceless acres of California grapes—saving the vines and crop from Hopper Burn.

Answering the call from Speonk, Shell men directed the spraying, by airplane, of one-half of a potato field with Shell Vapona D-42—D.D.T. in an oil base—the other half with another combination. A few days later the first half was fresh and vigorous. The other half, succumbing to the Leaf Hopper virus, was burned brown.

Shell's achievement was to produce an effective spray in *concentrated form*—make it suitable for use from airplanes or light field equipment, saving time, labor, and money.

One gallon of Shell oil base spray does the work of *20* gallons of water base spray.

Shell's original idea that oil was the right vehicle had to be proved every step of the way. By selection of crudes, special refining, and everlasting testing, Shell Research reached that result. With a full line of "pest-tested and plant-tested" oil base sprays, Shell makes another basic contribution to agricultural science . . .

Development of Vapona and other agricultural sprays is only one research achievement by which Shell demonstrates leadership in the petroleum industry, and in petroleum products. **Wherever you see the Shell name and trademark, Shell Research is your guarantee of quality.**

SHELL

Horizons wid
through
Shell Resear

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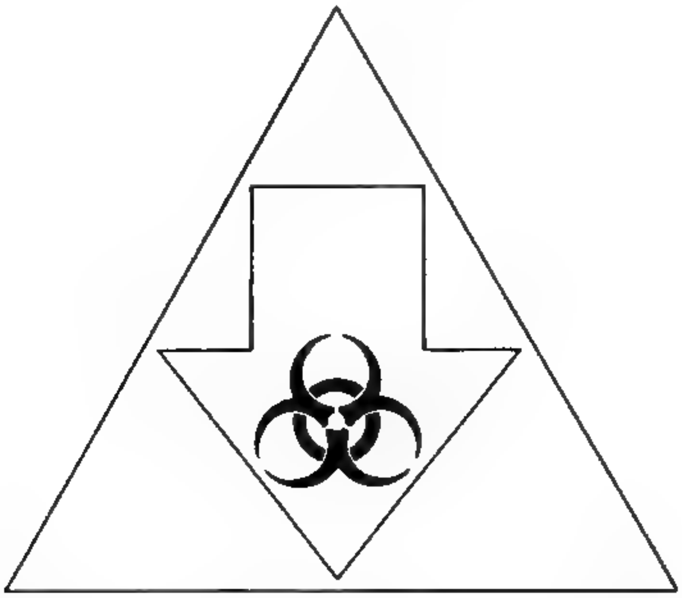
Incorporated



The United States of America, in the year ____, buried ___ metric tons of radioactive waste below this area. The surface of the land is safe, but the buried material could be dangerous if it were improperly moved or if the repository is damaged.

The buried radioactive waste was produced by the fission of uranium to generate electricity. The waste includes radioactive elements, such as plutonium, uranium, and cesium. The radioactive waste was stabilized in a glass material that has been packaged in metal canisters.

There are ___ waste canisters, buried ___ meters below the surface. These canisters have been emplaced in a (type of rock) formation in rows ___ meters apart, ___ canisters per row, and ___ meters from adjoining canisters. The canisters are located over an area ___ meters long and ___ meters wide.

The radioactive waste has been buried at this location and in this manner to ensure that the waste does not become dissolved in circulating ground water. If ground water contaminated by the waste were to reach the outside environment and enter a food chain, it could possibly harm living creatures. The potential for harm decreases significantly over the first 500 years, but the waste should continue to be left undisturbed if possible. Proper instructions for moving the waste or using the land above it without affecting these wastes can be found. More detailed information has been placed at other major libraries and archives.

These messages should be translated into languages common to your time. Future readers will be better able to understand and follow these messages if they are changed to the current language.

FIGURE 5-3. EXAMPLE OF THIRD LEVEL MESSAGE

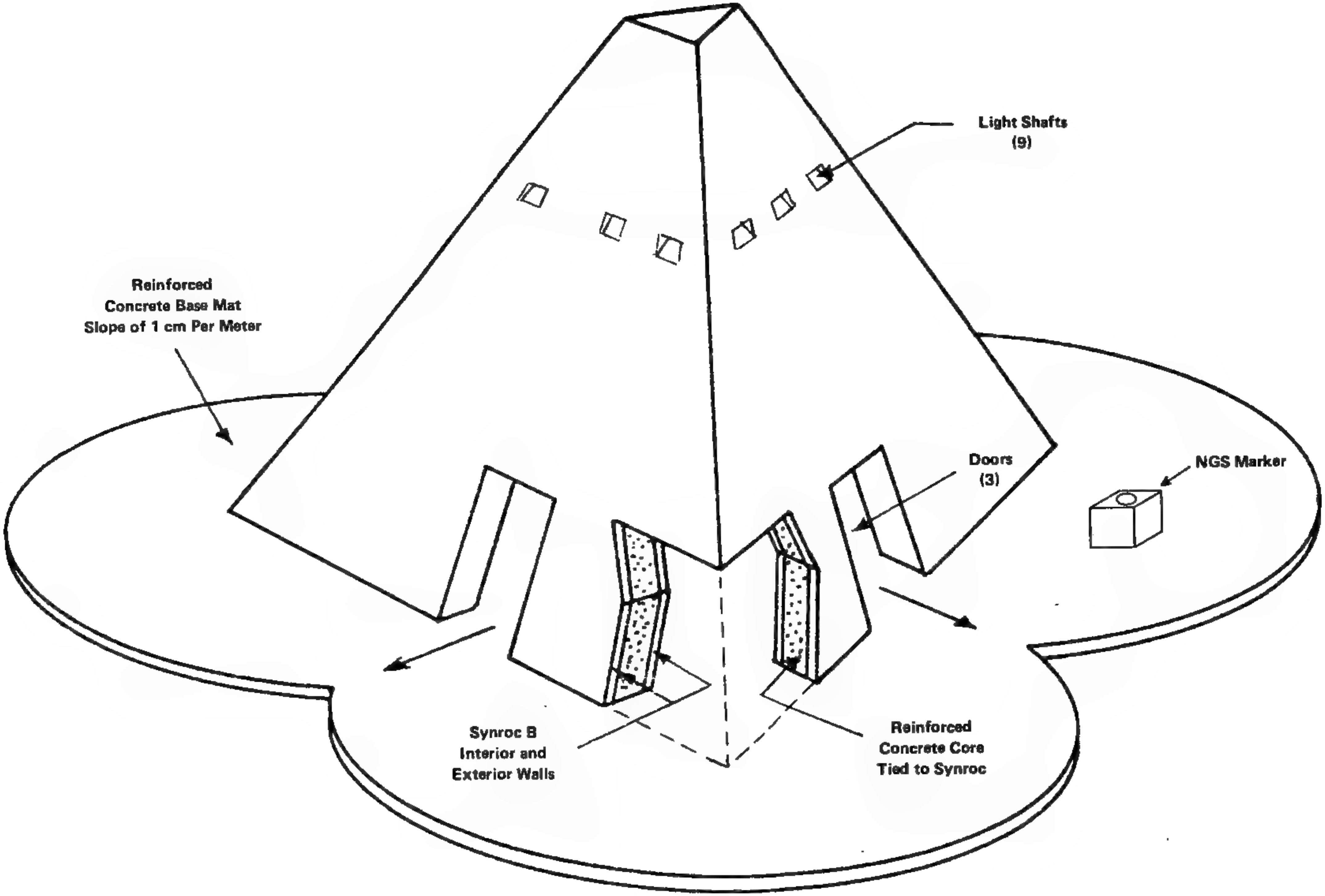
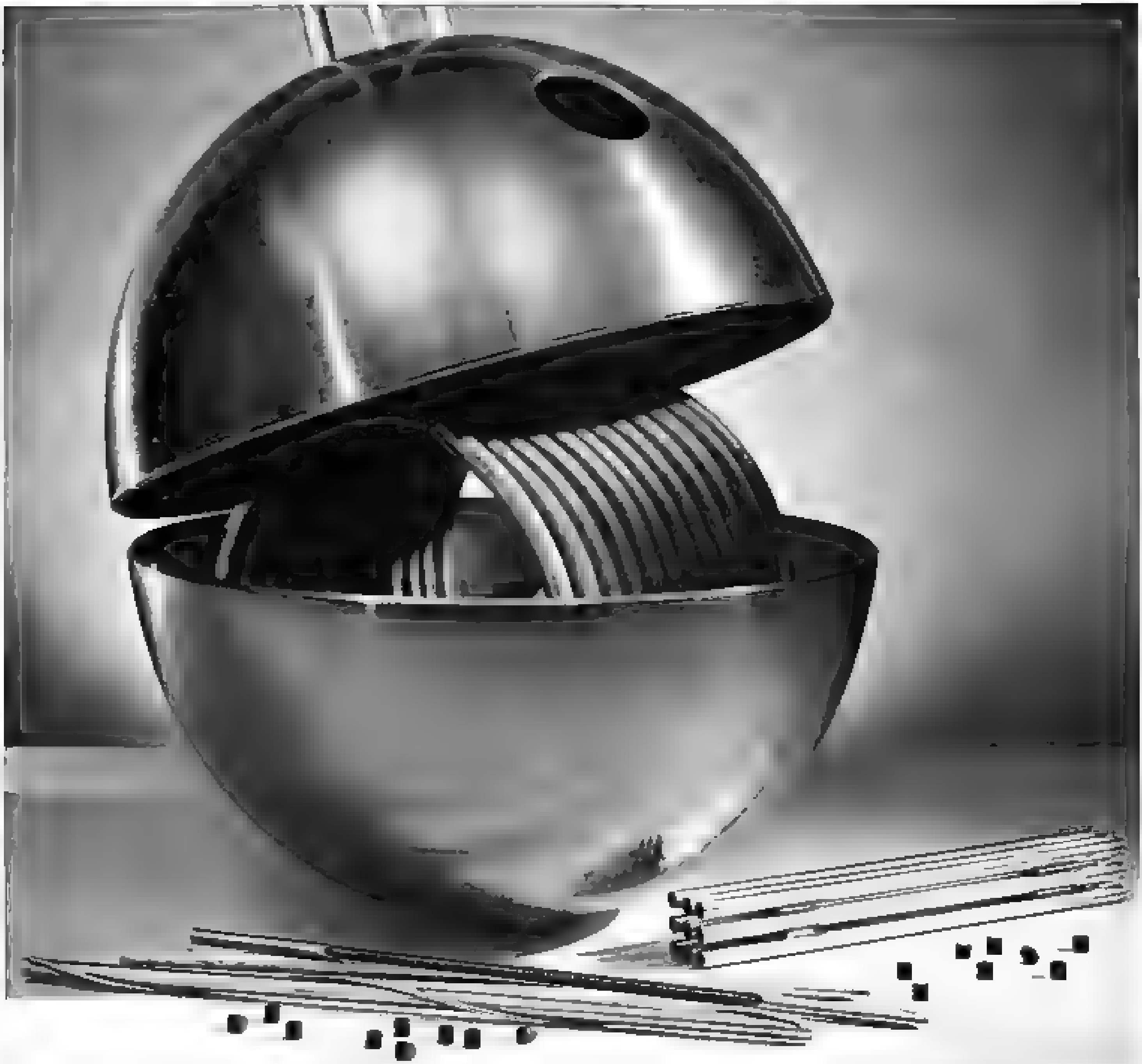


FIGURE 7-5. ALTERNATE CENTRAL MONUMENT



The sphere above is a "core" for one kind of research atomic reactor. The metal tubes in the foreground and at the right show various test designs for holding the small uranium fuel pellets in other kinds of atomic reactors.

Strange new "tools" of atomic-electric power

These are some of the strange new "tools" used to produce, test, or experiment with atomic-electric power. They are among the things that will help bring electricity from the atom.

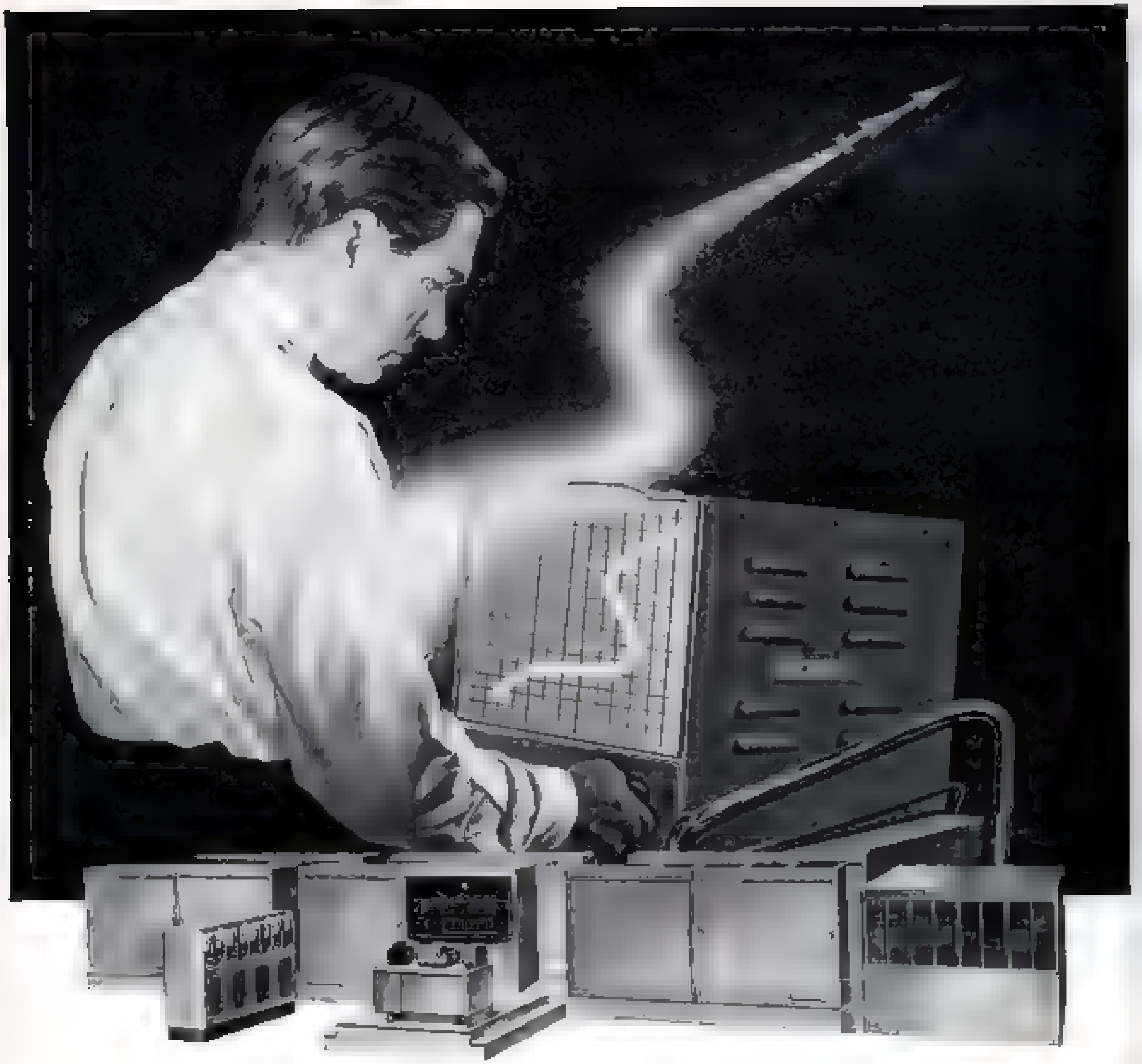
"Tools" like these are being used in developing several atomic-electric plants now under way. A number of electric light and power companies from many parts of the country are working with each other and with equipment manufacturers and the Atomic Energy Commission to develop the plants.

For more than 75 years, America's independent electric light and power companies have supplied more and more electricity to this growing nation. Today they produce more than any other single nation in the world. And they have helped develop ways to produce it more efficiently year after year. That's why you can expect electric companies to continue to do their part to advance the new science of producing electricity from the atom.

America's Independent Electric Light and Power Companies*

*Company names on request through this magazine

JonWilliamson.com



The Univac Scientific Computing System

Operation in Real-Time . . .

In the field of missile development, there's *only one* commercially available digital computer capable of real-time performance — the famous Univac® Scientific. It's the ideal system for flight simulation and for on-line data reduction. It solves complex problems from purely sensed data at speeds that are compatible with real-time control.

Because of its ability to reduce large volumes of data at tremendous speeds, the Univac Scientific System easily handles even the most difficult research problems. Furthermore, it offers many other outstanding characteristics, including superb operating efficiency obtained through large storage capacity . . . great programming versatility . . . the ability to operate simultaneously with a wide variety of input-output devices . . . and far greater reliability than any computer of its type.

For more information about the Univac Scientific System or for information about ways in which you might apply the system to your particular problems, write on your business letterhead to . . .

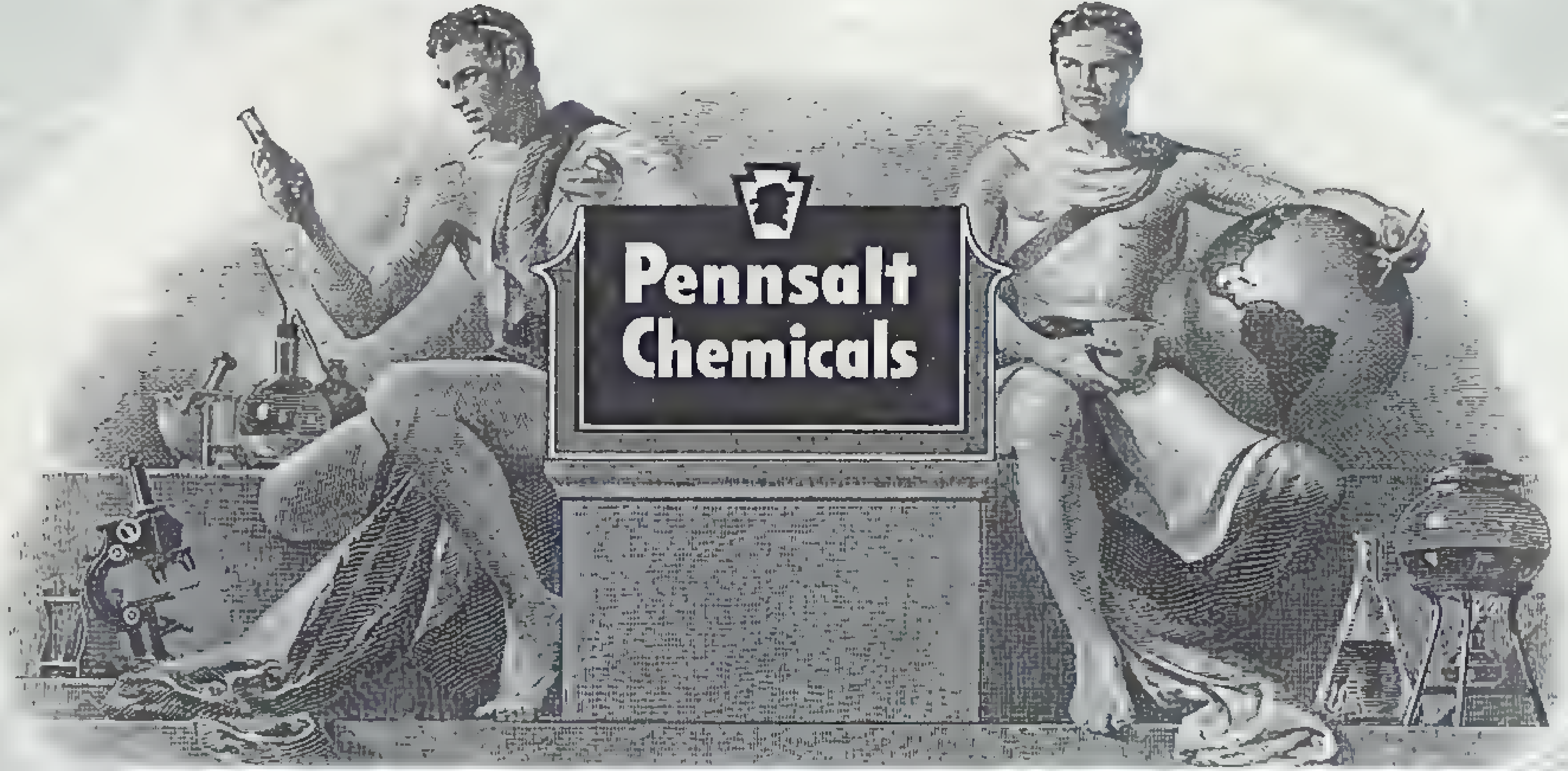
ROOM 1315, 315 FOURTH AVE., NEW YORK 10

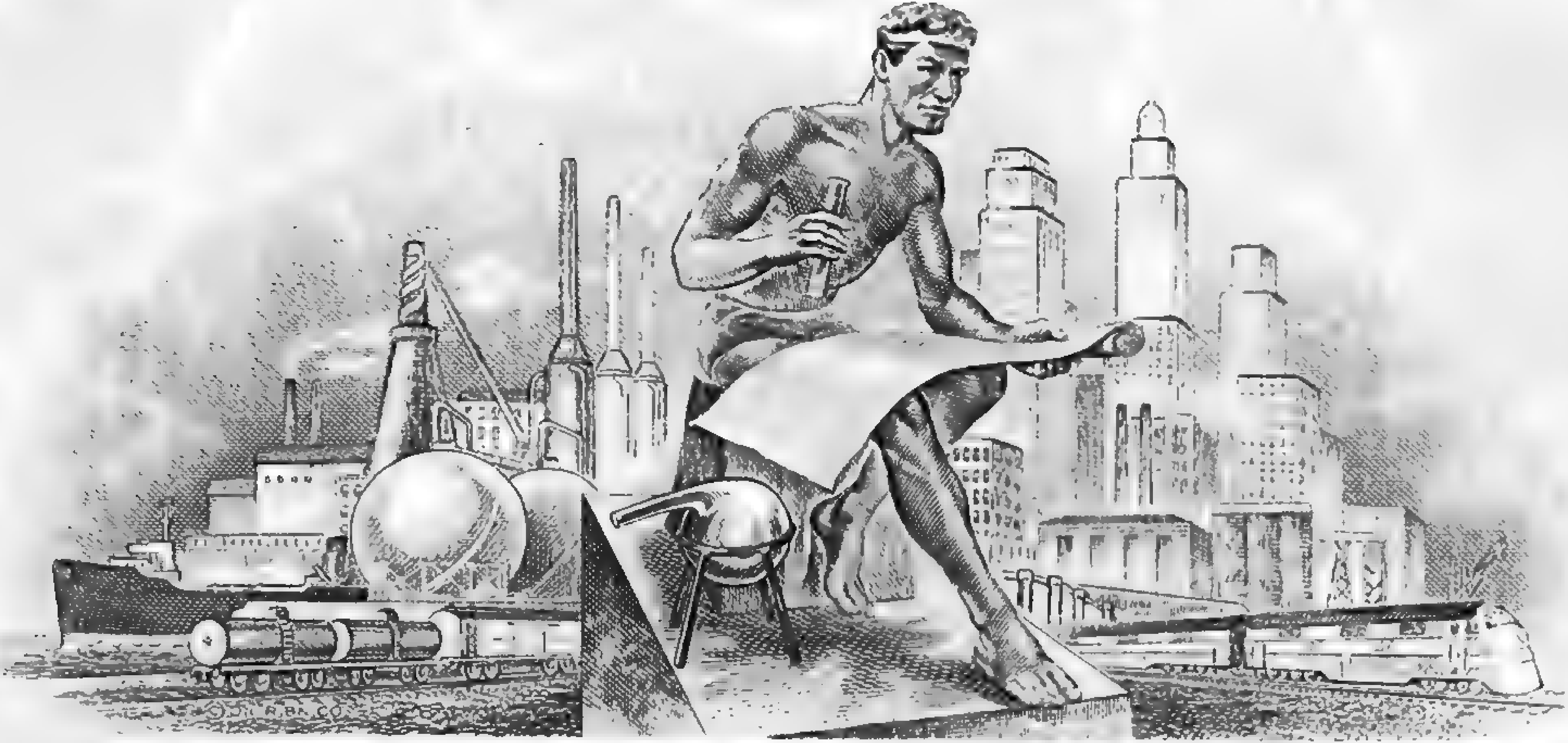
Remington Rand Univac

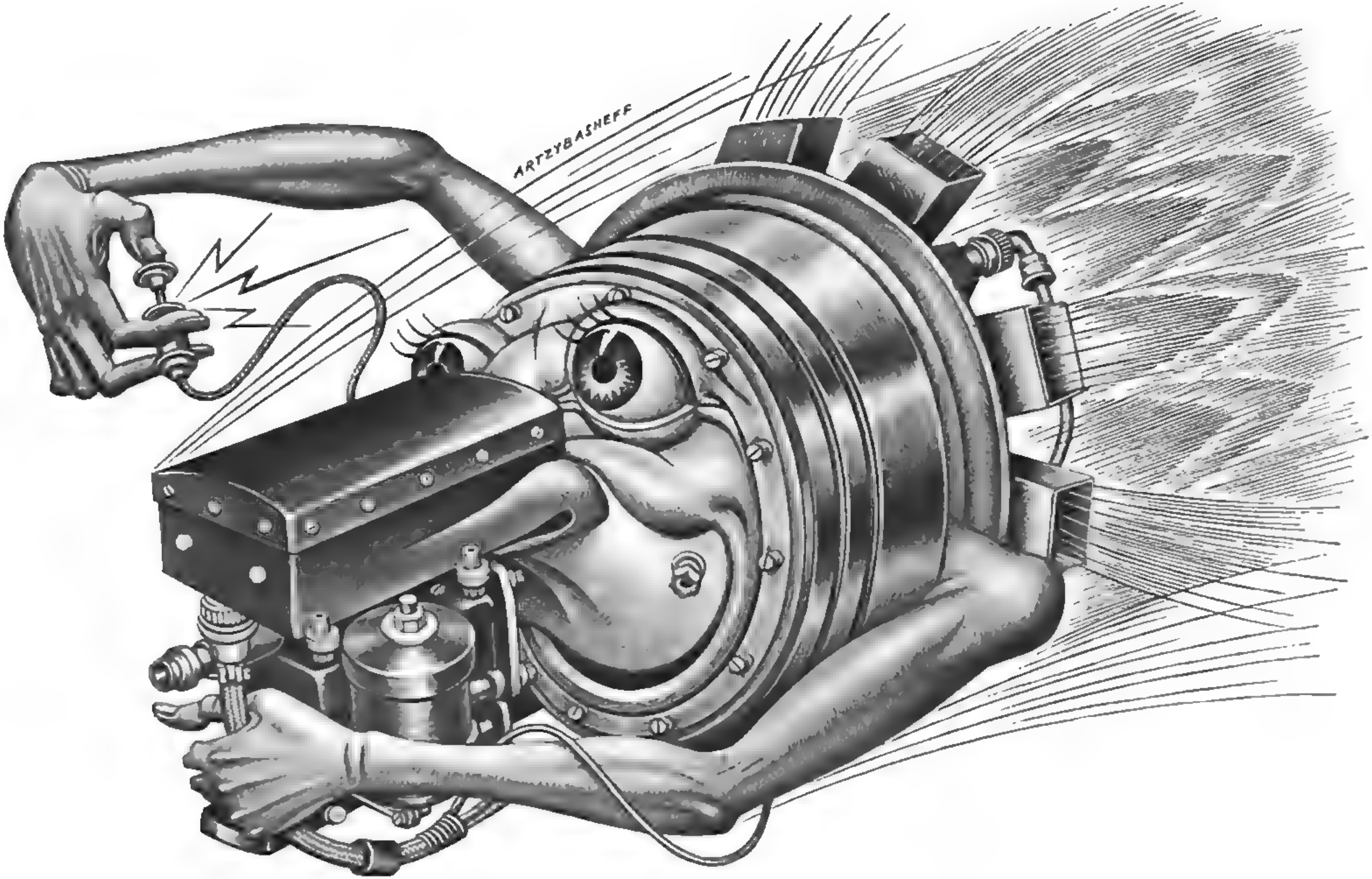
DIVISION OF SPERRY RAND CORPORATION

Supervisory DataCenter. More than 350 control centers using the basic principles outlined here have been sold by Honeywell for all types of buildings—including hospitals, schools, hotels, office and industrial buildings, banks, shopping centers and churches. They range in size from one square foot to many times larger than the panel shown here. A list of all of these installations or of those in your area will be furnished on request.

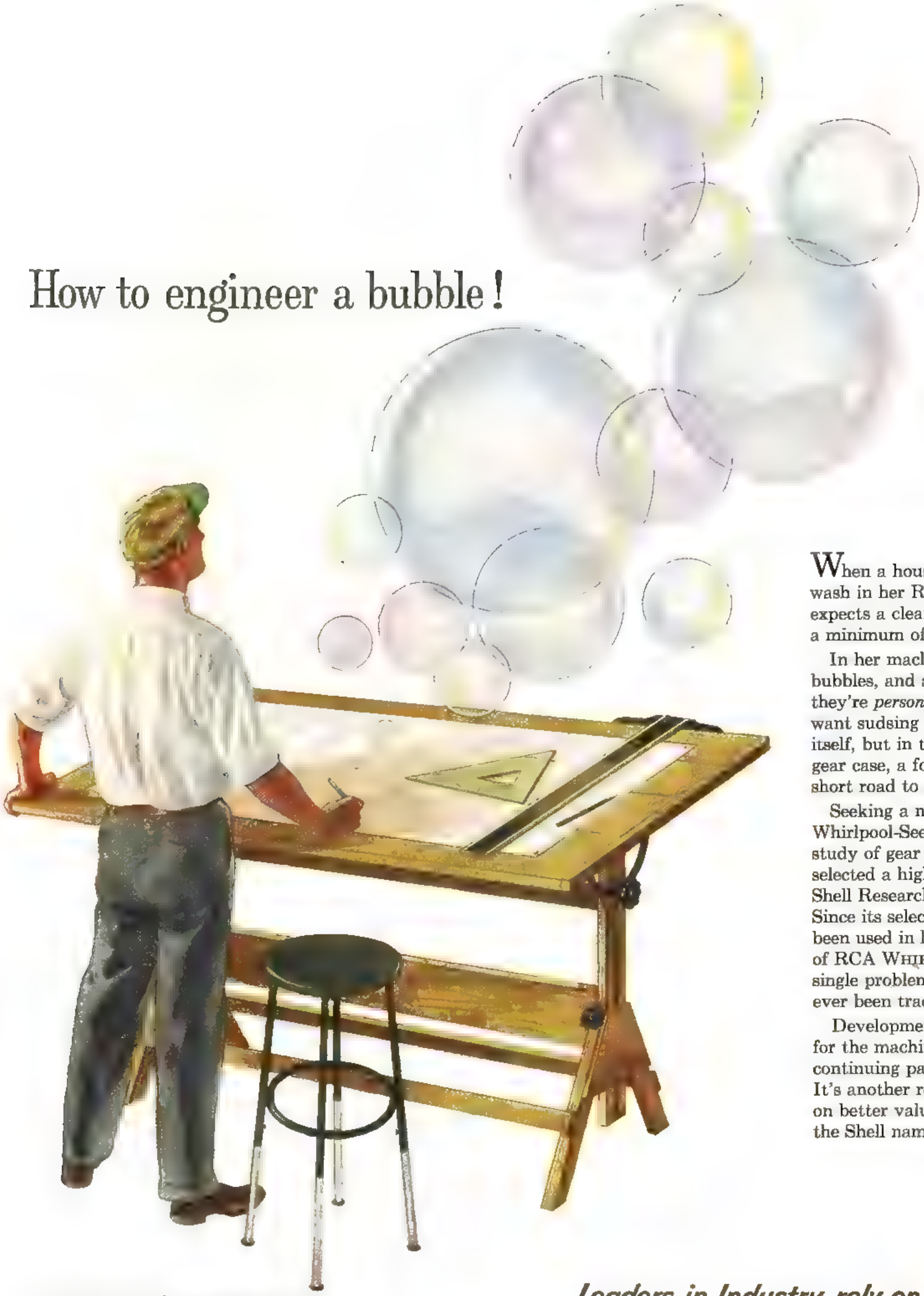
©ABNCo


Pennsalt
Chemicals


R.BN.CO


ARTZYBASHEFF

How to engineer a bubble!



RCA Whirlpool washers are built for long and trouble-free performance. A problem, caused by foaming oil in sealed gear cases, was solved by a product of Shell Research.

When a housewife loads the family wash in her RCA Whirlpool, she expects a clean, clean wash—with a minimum of fuss.

In her machine there's a place for bubbles, and another place where they're *persona non grata*. You want sudsing action in the tub itself, but in the washing machine's gear case, a foaming lubricant is the short road to trouble.

Seeking a non-foaming oil, Whirlpool-Seeger made a special study of gear case lubricants and selected a highly stable product of Shell Research—Shell Tellus Oil. Since its selection in 1953, it has been used in hundreds of thousands of RCA Whirlpool washers. Not a single problem in the gear cases has ever been traced to lubrication.

Development of better lubricants for the machines we live by is a continuing part of Shell's research. It's another reason you can count on better values wherever you see the Shell name and trademarks.

Leaders in Industry rely on Shell Industrial Products

SHELL

OUT OF THE SHADOW

For centuries mankind has lived under the dread shadow of the white plague—tuberculosis. Medical historians have found recognizable descriptions of the disease even in the early writings of Greek, Roman and Arabian physicians.

Seventy years ago, however, the shadow first began to lighten when Robert Koch confirmed the nature of the infection. Since then medical science—aided by the tremendous development of the pharmaceutical industry—has made great progress in the treatment of the disease. Currently, potent new anti-tuberculosis agents are undergoing intensive investigation; the newest of these—isonicotinic acid hydrazide—may bring us even closer to our goal of complete control.

Large-scale production of hydrazine needed for this anti-tuberculosis drug is a result of Mathieson's recognition of hydrazine's potential usefulness to the chemical industry. This onetime chemical curiosity is now available in commercial quantities for such widely diversified uses as in pharmaceuticals, as a rocket fuel, in insecticides and herbicides and in various manufacturing processes . . . one of many vital Mathieson chemicals serving industry, agriculture and public health.

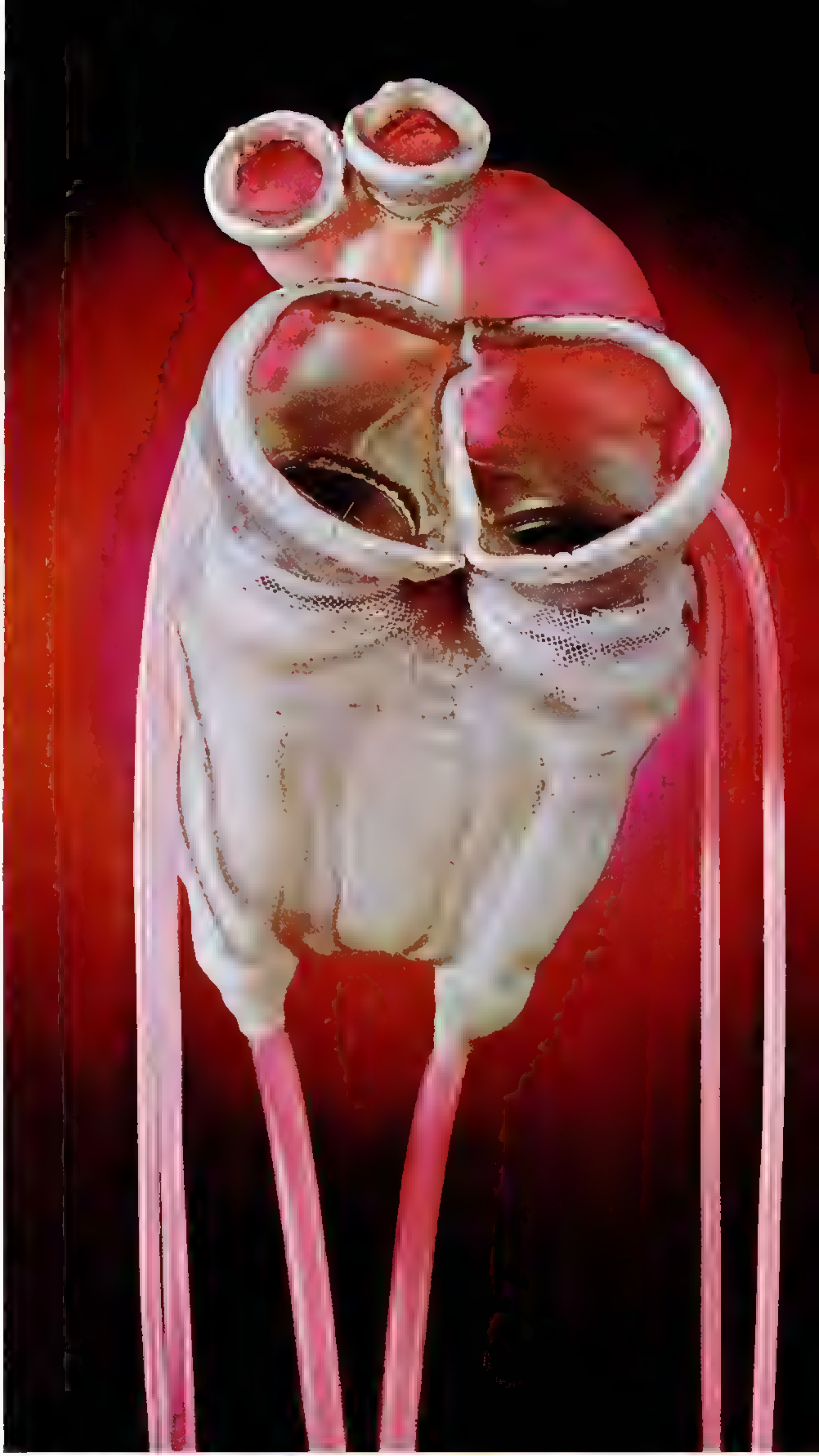
Mathieson
CHEMICALS

MATHIESON CHEMICAL CORPORATION • BALTIMORE 3, MARYLAND

Experimental devices hasten the day when a patient can get

A New Heart

After valve replacement, the next logical step is to replace other parts of the heart—and ultimately, the entire heart. The weird object at near right, photographed at about actual size, is an experimental synthetic heart developed by a team headed by Dr. Willem Kolff at the Cleveland Clinic. Made of Silastic, it has four chambers, four valves and two main arteries. Hooked up to a machine that shoots rhythmic spurts of compressed air between the layers of the ventricle walls, it duplicates the pumping action of a real heart. The five air-driven devices on the right-hand page, shown smaller than natural size, are designed to replace or assist certain parts of the heart. The one at the center, developed at the National Heart Institute, fits around the ventricles and makes them pump by expanding and contracting. At upper left is a bypass for the left ventricle, designed by a team from Baylor and Rice universities. It pumps in parallel with an ailing heart and can be turned down or off when the heart recovers, as can the ventricle booster at upper right, paced electronically by the heart's own beats. Developed at Maimonides Hospital in Brooklyn and the Avco-Everett Research Laboratory, it may be used in human patients soon. At lower left are a pair of Baylor-Rice intraventricular pumps. These, placed inside ventricles, pump by ballooning inner walls. The Lucite device at lower right is a replacement for both ventricles developed by the Harry Diamond Laboratories.
To see results of an actual surgical implant of Dr. Kolff's mechanical heart—into a calf—turn the page.



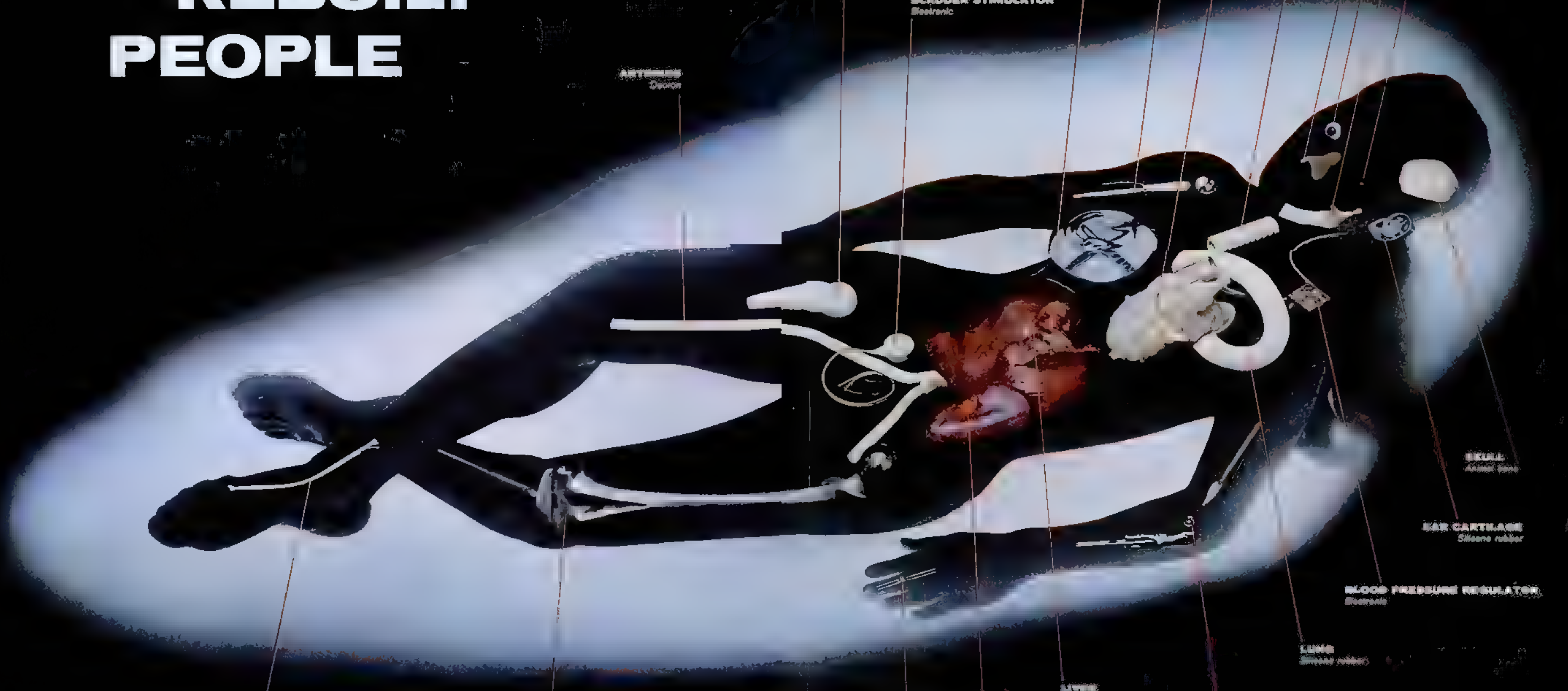
CONTROL
OF LIFE
PART 3

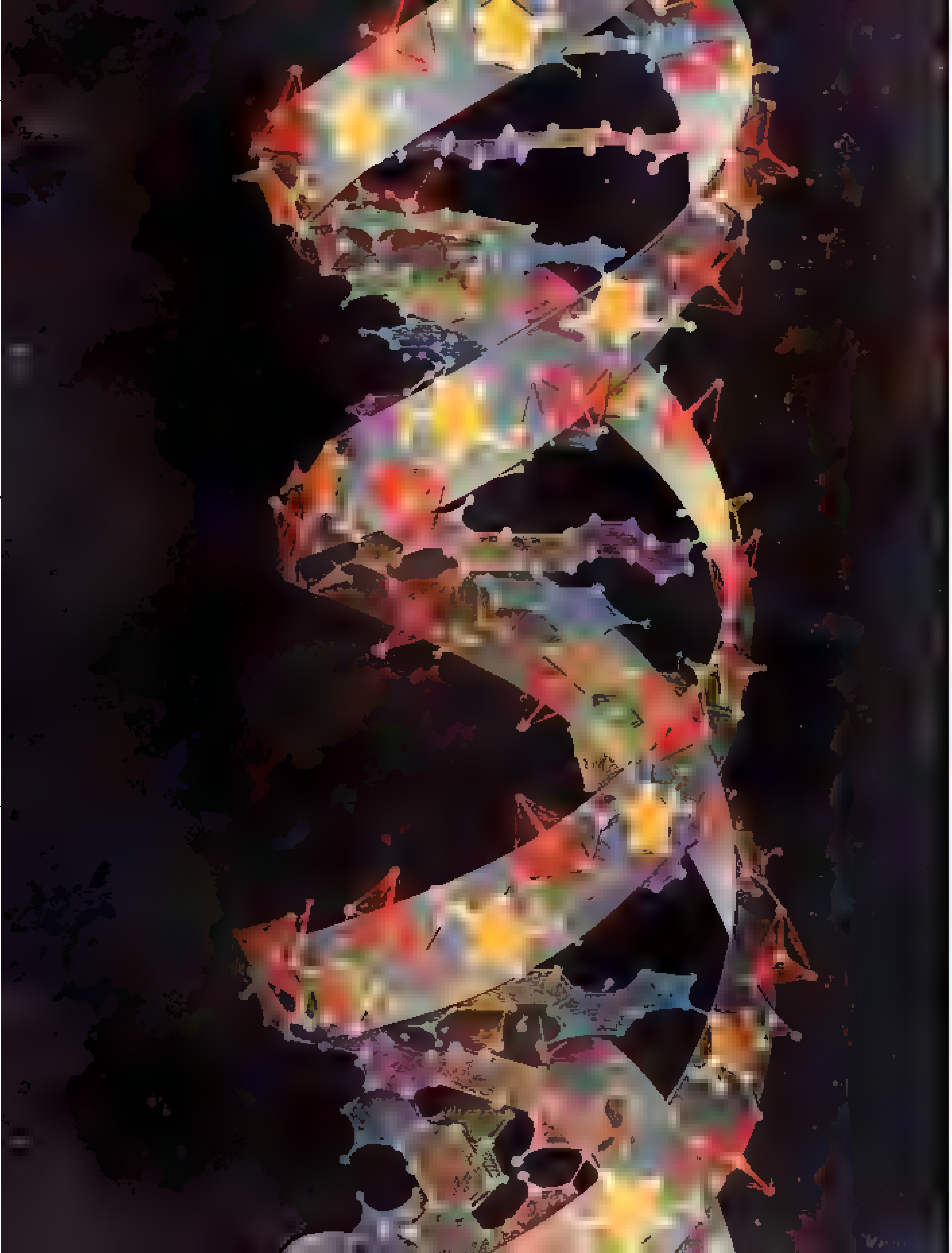
Photographed by RALPH MORSE

Manmade and transplanted organs usher in an era of

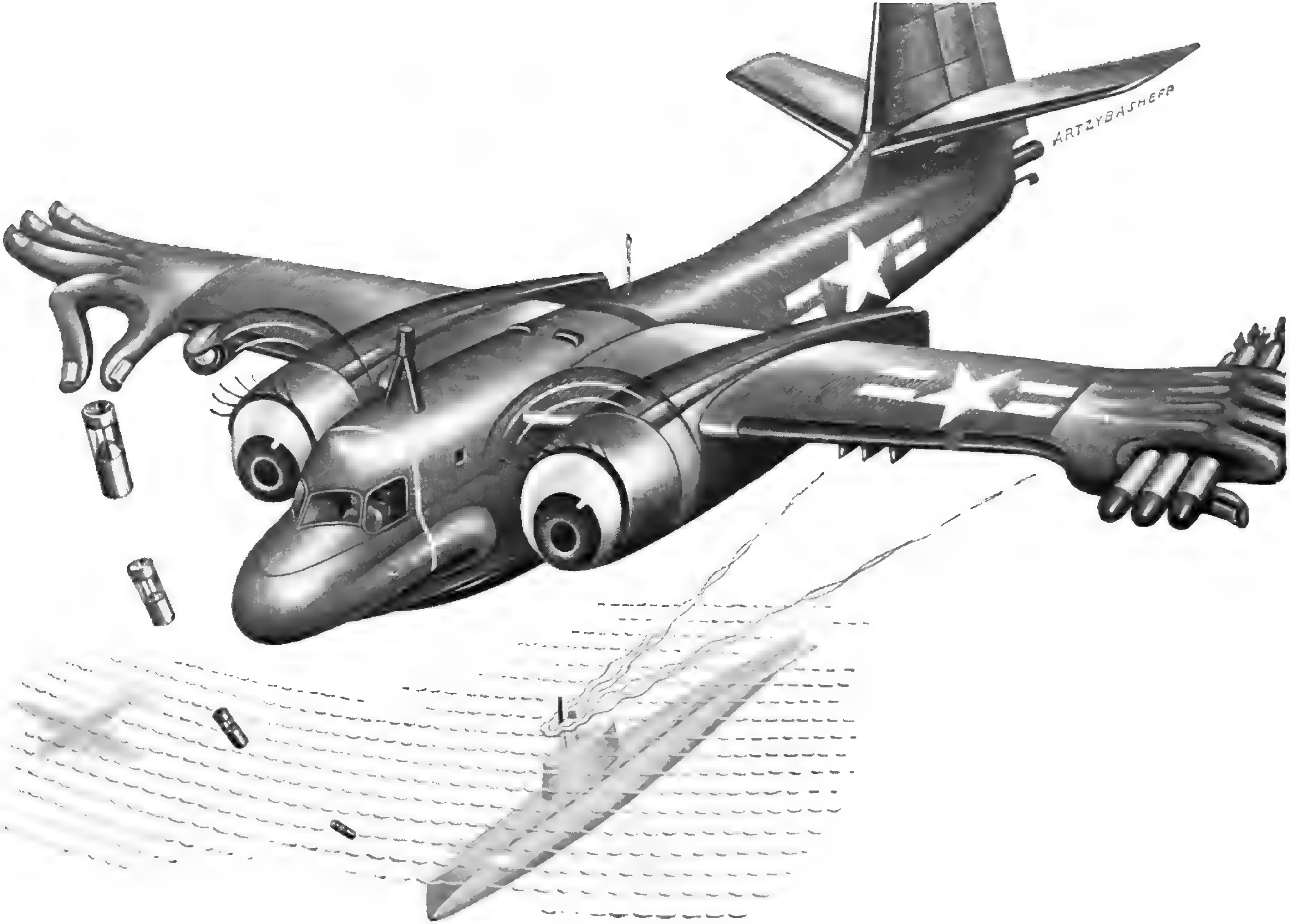
REBUILT PEOPLE

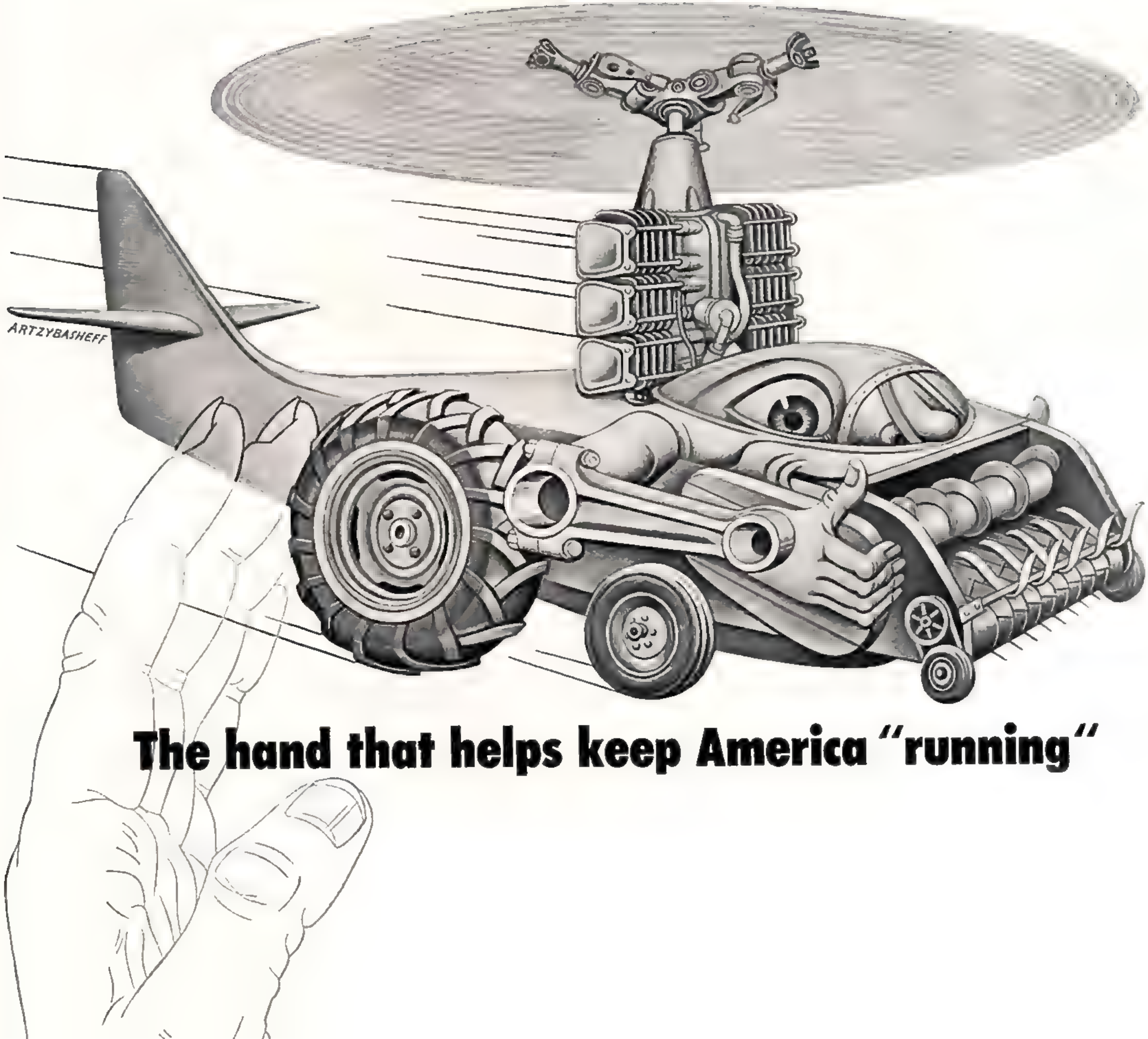
The amazing success of medical science in prolonging life is producing two situations with profound moral, even theological, implications. The surgeon, transplanting organs from one human being to another, is making man ever more literally part of his fellow man. At the same time, by implanting synthetic organs, he is to some degree reducing the difference between man and machine—even while machines perform ever more human functions. In the young woman shown in the symbolic photograph below, all the replacement parts are an illusion implanted by composite photography. But, except for the still-experimental synthetic heart and lung, it would be possible (though unlikely) for her to possess them all. Transplanted kidneys are now commonplace, and while it is true that patients with transplanted livers have never yet lived more than a few weeks, new techniques are being sought to extend the time significantly. The other parts, made of materials that do not undergo adverse chemical reactions in the body, are in use or soon will be. Joints and bones are made of Vitallium, a metal that has been in use 28 years. More like natural bone is Cerosium, a new ceramic that has been used to replace jawbones and has recently been fashioned into a hip joint replacement. The most versatile material of all is Silastic, a silicone rubber which has an enormous range of flexibility and consistency. It imitates body fat in a synthetic breast, muscle in the artificial heart and cartilage in ear and nose replacements. And in the early attempt at an implantable lung, shown in the picture, it incredibly mimics the capillaries of the lung. The following pages show some dramatic applications of the new implantation techniques, using both natural organs and ingenious imitations.





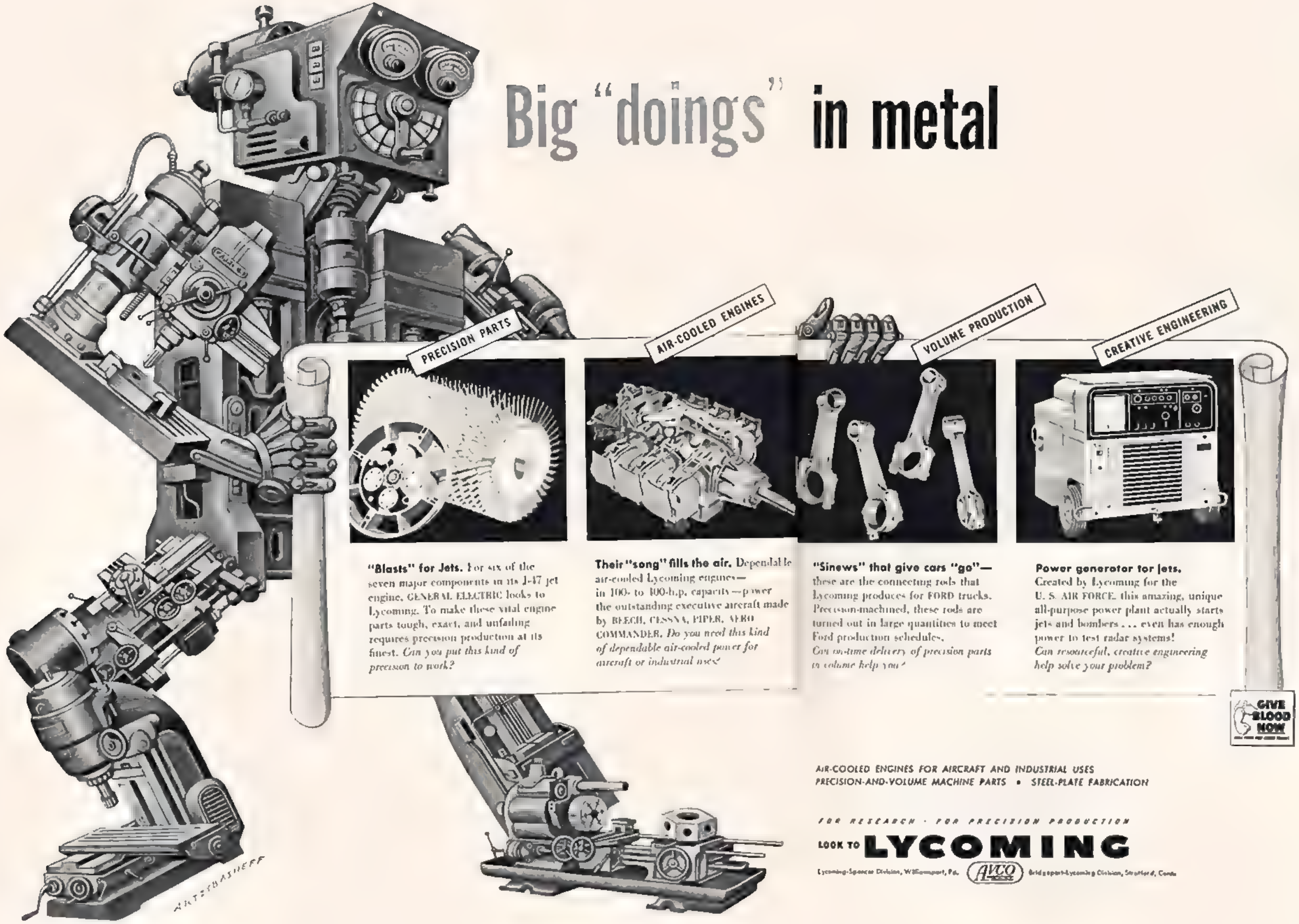
One becomes two: this is the essence of life. Biologists now believe that the key to this process inside the cell is the long-chain molecule known as deoxyribonucleic acid, or DNA. At left is an infinitesimal portion of a "model" of DNA suggested in 1953 by James Watson and Francis H. C. Crick. It consists of two spiral and intertwining chains, whose various molecular subunits are represented by colored shapes. Bridging the chains, like rungs on a ladder, are pairs of molecular subunits called "nucleotides," which are essential to replication. The whole is so constructed that if the two chains are pulled apart, separating the paired nucleotides, each chain will contain all that is necessary to direct the recreation of the missing half. In this way one molecule of DNA can become two—and life can go on.


ARTZYBASHEFF



The hand that helps keep America "running"

Big "doings" in metal



"Blasts" for Jets. For six of the seven major components in its J-47 jet engine, GENERAL ELECTRIC looks to Lycoming. To make these vital engine parts tough, exact, and unfailing requires precision production at its finest. *Can you put this kind of precision to work?*

Their "song" fills the air. Dependable air-cooled Lycoming engines—in 100- to 400-h.p. capacity—power the outstanding executive aircraft made by BEECH, CESSNA, PIPER, AERO COMMANDER. *Do you need this kind of dependable air-cooled power for aircraft or industrial uses?*

"Sinews" that give cars "go"—these are the connecting rods that Lycoming produces for FORD trucks. Precision-machined, these rods are turned out in large quantities to meet Ford production schedules. *Can on-time delivery of precision parts in volume help you?*

Power generator for Jets. Created by Lycoming for the U. S. AIR FORCE, this amazing, unique all-purpose power plant actually starts jets and bombers . . . even has enough power to test radar systems! *Can resourceful, creative engineering help solve your problem?*

GIVE BLOOD NOW

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES
PRECISION-AND-VOLUME MACHINE PARTS • STEEL-PLATE FABRICATION

FOR RESEARCH · FOR PRECISION PRODUCTION

LOOK TO **LYCOMING**

Lycoming-Spencer Division, Williamsport, Pa. AVCO Bridgeport-Lycoming Division, Stratford, Conn.

Here are just four outstanding achievements of Lycoming's precision production . . . samples that indicate how Lycoming solves metal-working problems for America's industrial leaders and the Armed Forces.

Need a tiny gear machined to the finest tolerances? Need precision parts—produced in quantity—produced on time? Like to see how truly creative engineering can work out the answer to *your* metal-working problem?

Then look to Lycoming—long on experience, varied in skills!

Even these few samples demonstrate that Lycoming has the machines you can use—the skilled craftsmen you can use . . . the immense facilities you can use . . . the creative thinking you can use!

Yes, these Lycoming achievements should help you understand why we say in all confidence—"For a metal product that requires speedy, precise fabrication . . . or for the development of 'just an idea' in the rough or blueprint stage . . . *look to Lycoming!*"

For a more complete story on Lycoming's varied skills and facilities, write for the interesting, illustrated booklet, "Let's look at Lycoming."

Lycoming-Spencer Division, AVCO Mfg. Corp.
652 Oliver Street
Williamsport, Pa.

Please send me further information on Lycoming's varied abilities and facilities

Name______________________________
Firm_______________ Title_______________
Address____________________________
City____________ Zone______ State______

COSTLY as a rare perfume, it's "only" gasoline—but *100% more powerful* than the finest aviation gasoline now in use.

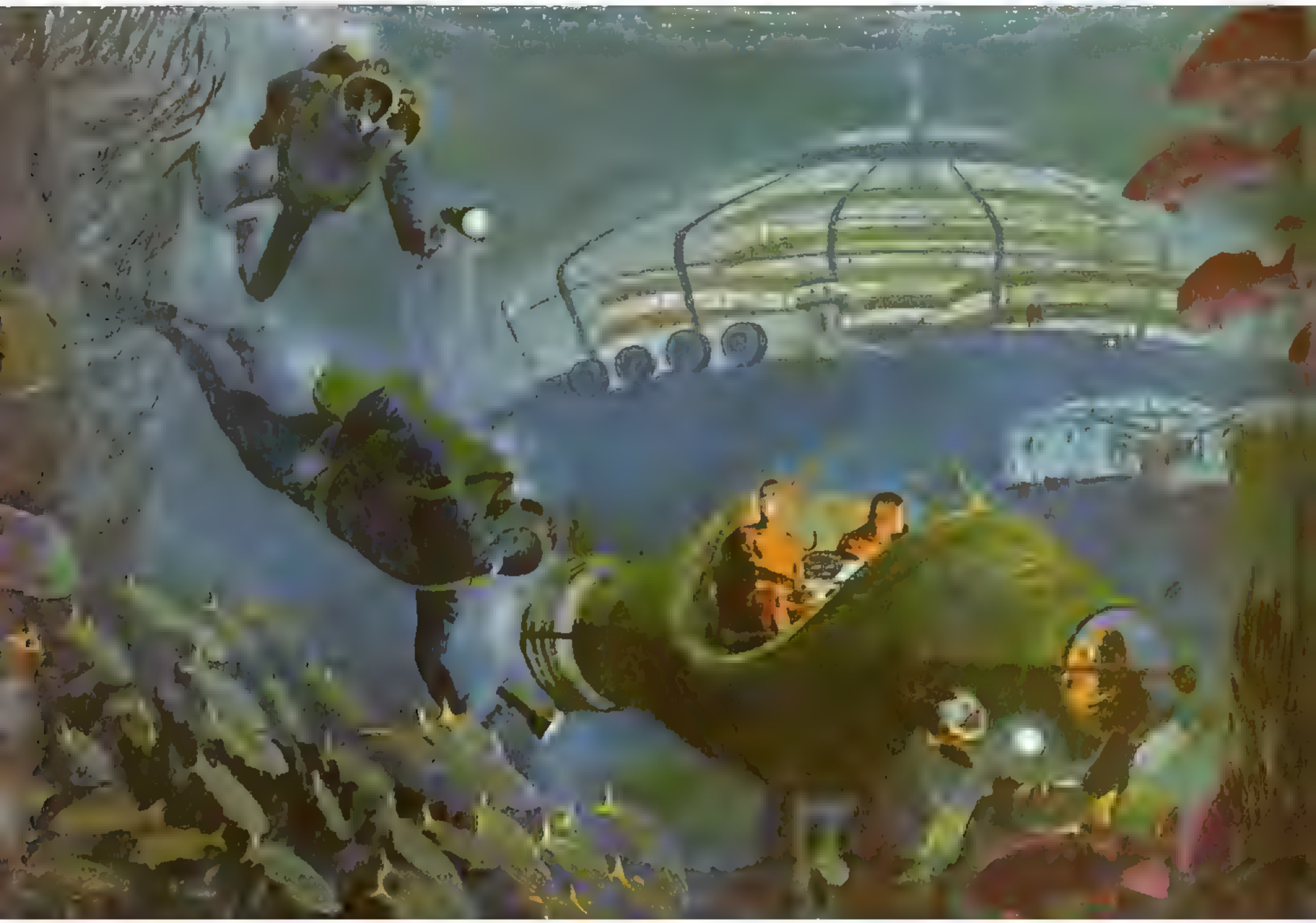
It was produced at the "University of Petroleum," Shell's research laboratories where 1481 scientists and technicians are at work. As fuel, it is useless at such cost. But as the "essence of knowledge" . . . "distilled wisdom" . . . which will lead to the commercial production of such fuel, it is priceless.

Every major advance in fuel requires an equal advance in engine design—for highest efficiency. Shell is already supplying fuel *25% more powerful* than today's aviation gasoline, for the experimental use of engine designers. Shell scientists know now that they can make, commercially, an even *more powerful* fuel—when the engines are ready for it.

This means that America's fighting planes will have new speed, new range, new "ceiling"—out of the class of others. Horizons widen through Shell research . . .

This advancing knowledge of Shell Scientists
speeds America's war production through
SHELL INDUSTRIAL LUBRICANTS

The research that puts a Tiger in your tank...
goes deeper than you'd think.



More than two-thirds of the earth lies underwater, its resources largely unknown and untapped.

What are we doing about it?

For over thirty years Humble research has been going deeper and deeper. Pioneering new ways of prospecting for oil under the oceans and bringing it up on land. Studying deep water currents and forces and how to withstand them. Developing new materials — plastics, rubbers and corrosion resistant coatings — and new technologies to meet the needs of life undersea.

All to help man reach the great wealth and beauty of the deep — and to assure a dependable supply of energy for the free world.

These same laboratories turn their skills to products you can buy today — like gasoline that "Puts a Tiger in Your Tank." Try a tankful — fill up with High-energy Enco Extra gasoline at the sign of "Happy Motoring!"®

ENCO

HUMBLE
RESEARCH WORKS
WONDERS WITH OIL

HUMBLE OIL & REFINING COMPANY. . AMERICA'S LEADING ENERGY COMPANY

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5½ *horsepower lifts 1-ton tire*

Your car can get 5 to 10 more horsepower with New Shell X-100 Motor Oil Premium

In your *everyday driving* you can get a horsepower increase greater than the power required to lift the largest tires made.

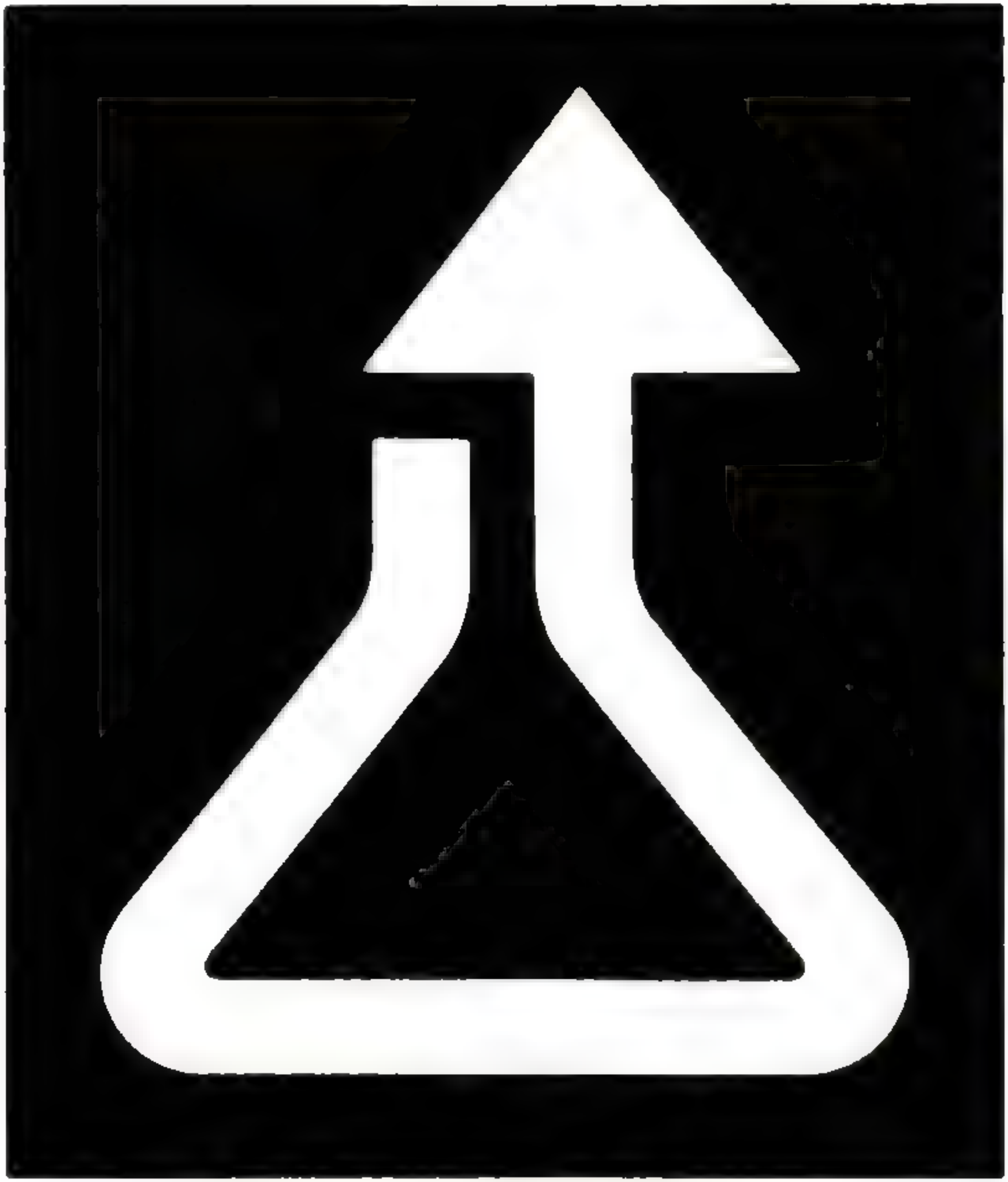
Here are the facts:

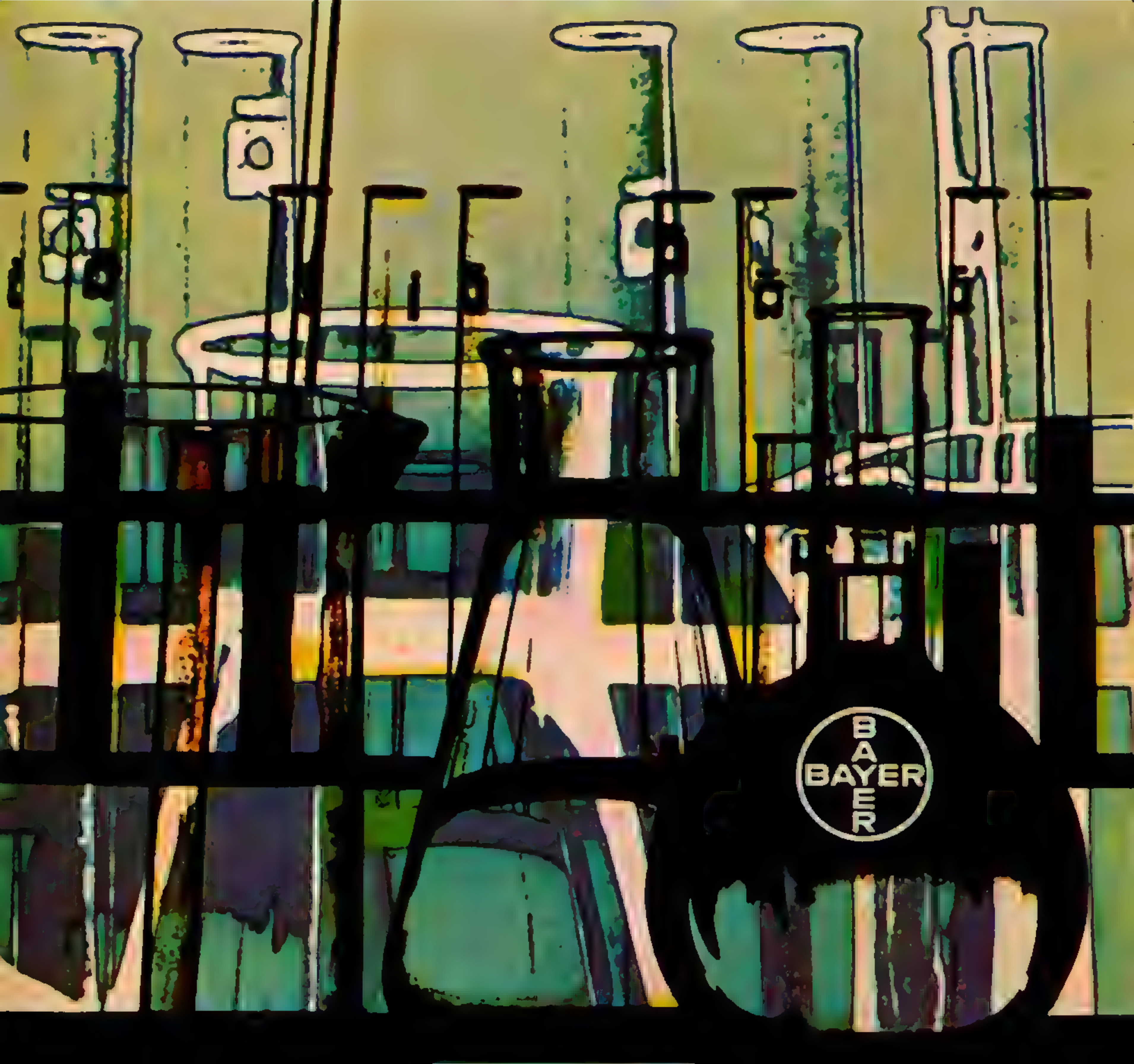
Under typical driving conditions, your engine seldom fully warms up. This is when widely used conventional oils cause engine drag and cost you power. But a new motor oil, developed by Shell Research, flows freely from the moment you start up—making available 5 to 10 more horsepower.

In addition to giving you this extra power, X-100® Motor Oil Premium protects your engine against acid action, the major cause of engine wear.

This new motor oil costs slightly more than conventional oils, yet it's an investment that pays you dividends every time you start your car.

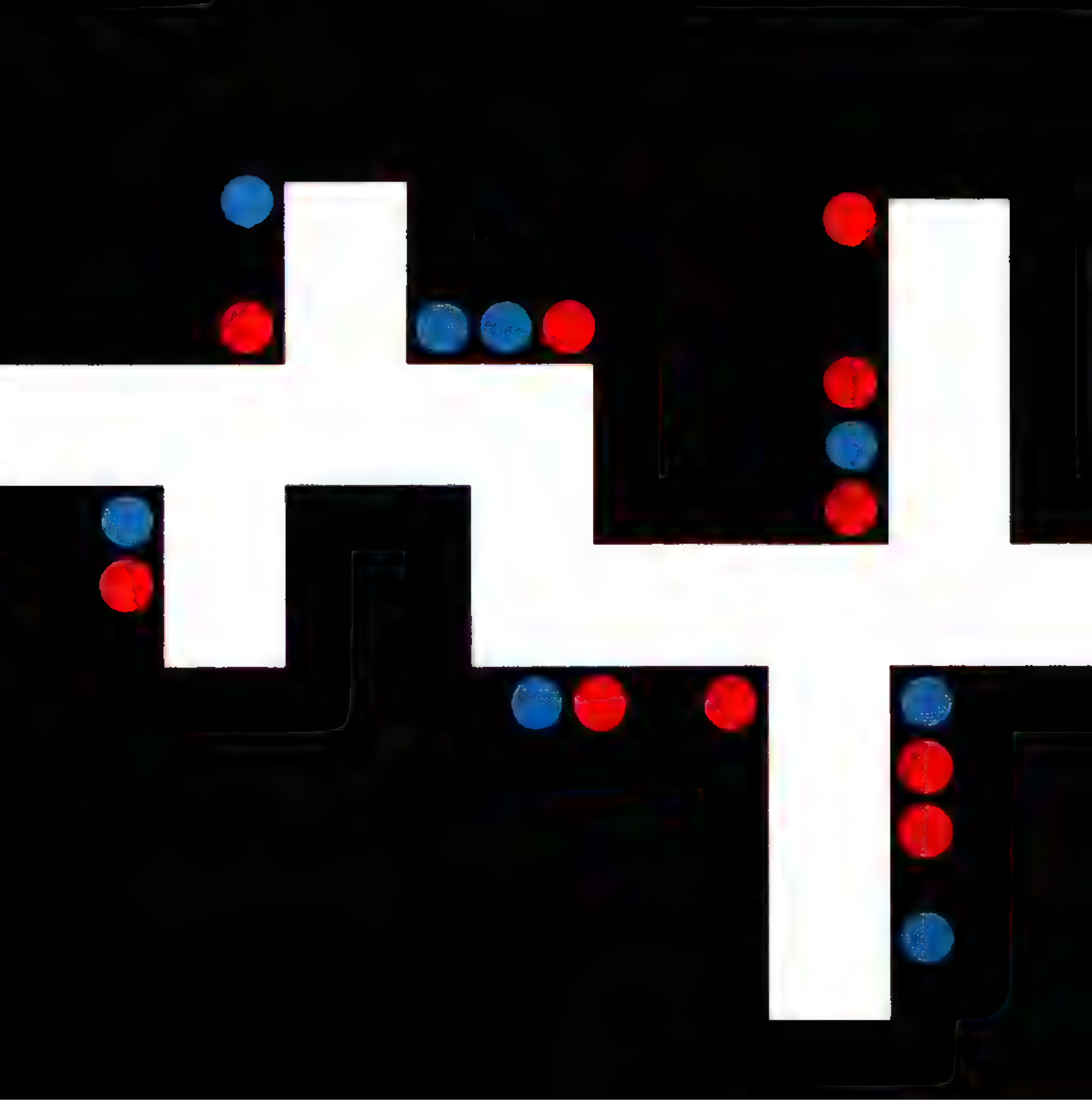
Let your Shell Dealer drain and refill the crankcase with Shell X-100 Motor Oil Premium next time you're due for a change. It's the finest protection your engine can have.

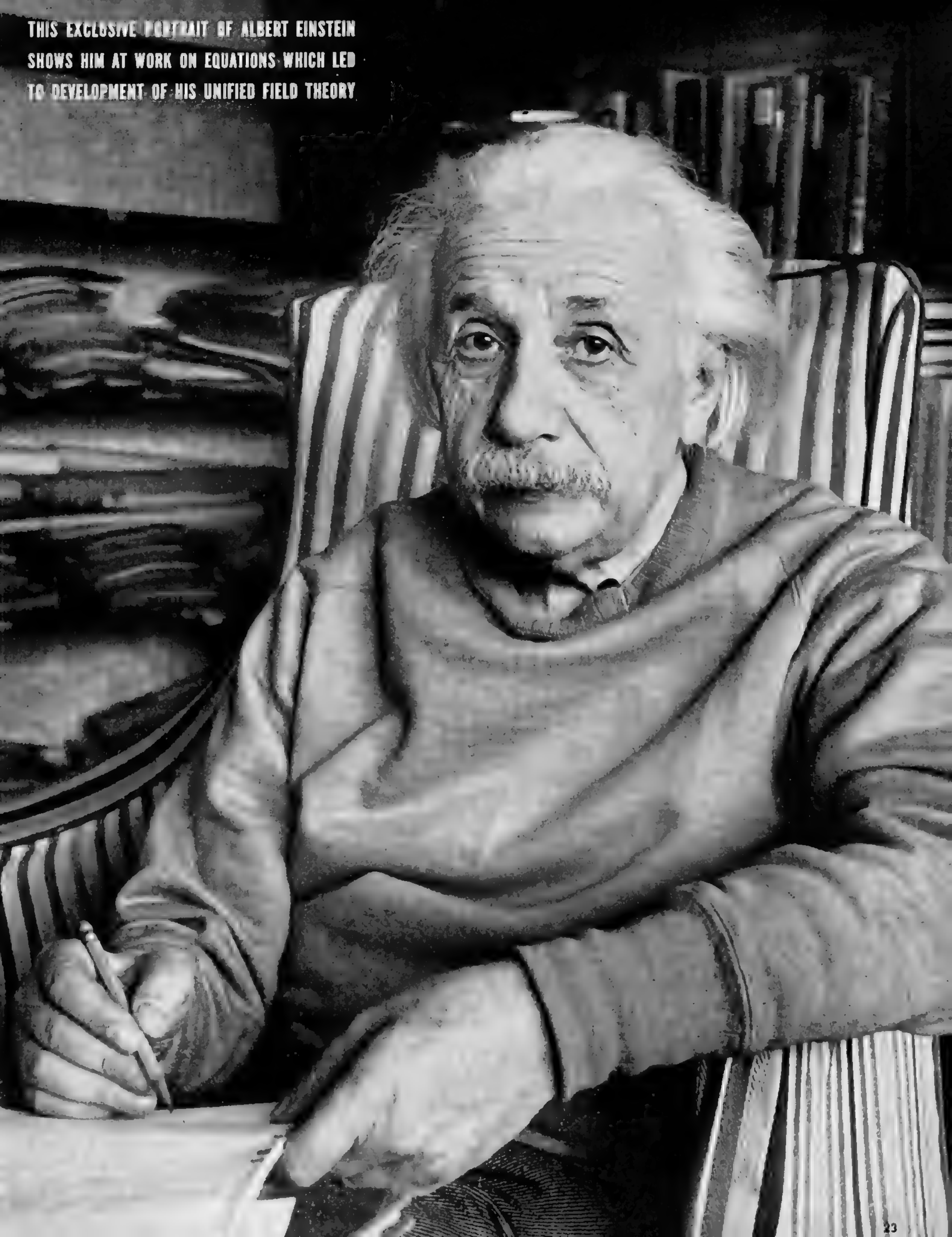



BAYER
BAYER

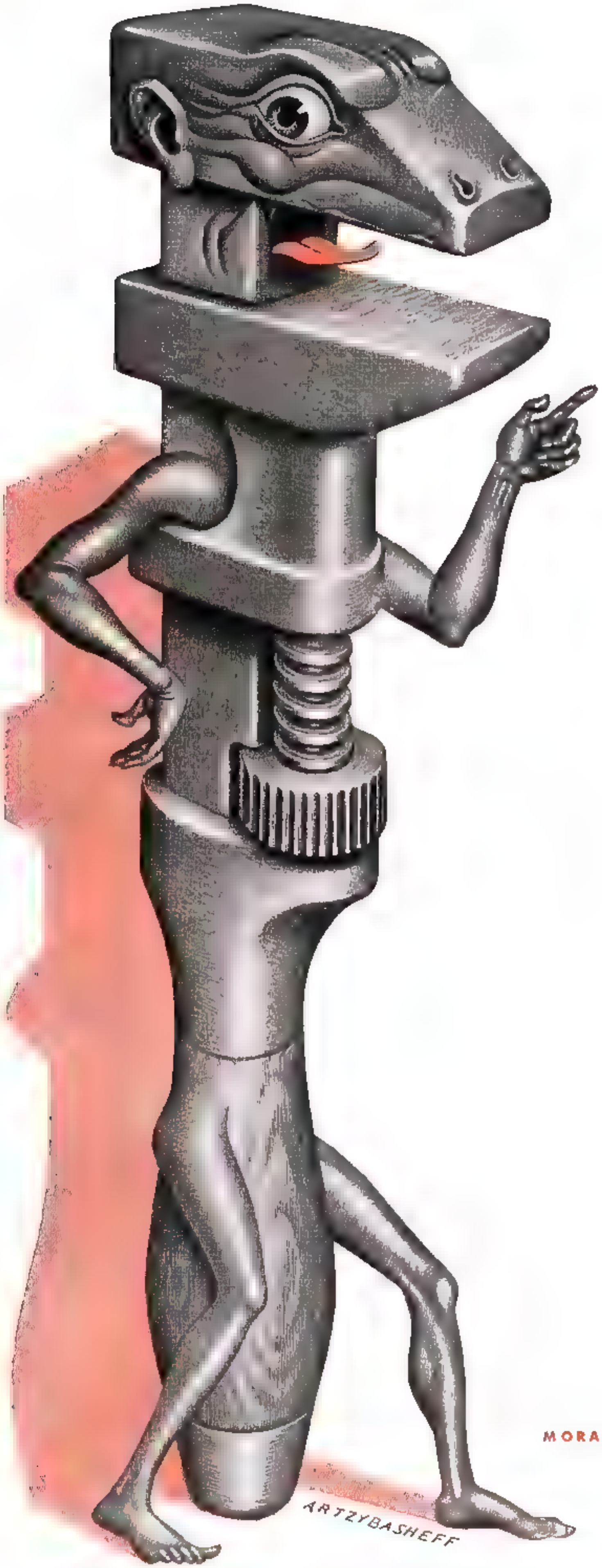
IBM

Production Line Balancing





THIS EXCLUSIVE PORTRAIT OF ALBERT EINSTEIN SHOWS HIM AT WORK ON EQUATIONS WHICH LED TO DEVELOPMENT OF HIS UNIFIED FIELD THEORY



$65,000 monkey wrench

(but this business never even felt it when it fell!)

AT THE HEIGHT of the processing season in a Midwestern foodstuffs plant, a superheater tube blew in the main boiler.

The accident to this key piece of equipment shut down the plant—threw a monkey wrench into production plans for the next few months.

Direct damage, covered by the firm's Boiler and Machinery insurance, was $2000. But the cost to the company as a result of the lost production was $65,000.

Fortunately, Business Interruption insurance—written in connection with a Boiler and Machinery policy—paid this loss. It placed this company in *just as good financial position after production was interrupted as before*

As this case may remind you, any manufacturer is risking his earnings if production is dependent upon the ability of plant equipment to *keep on producing*.

Travelers Business Interruption insurance (often called Use and Occupancy insurance) is designed to take over such a risk for you.

During the time production is curtailed (or stopped entirely) because of a boiler explosion—or because of an accident to a key machine—earnings slump or stop altogether; while expenses keep right on. This insurance not only pays these continuing expenses but also the profits which would have been realized had no accident occurred.

For either manufacturing or mercantile businesses, Business Interruption insurance is relatively inexpensive. Especially when you realize that it may mean the difference between a profit and a serious loss.

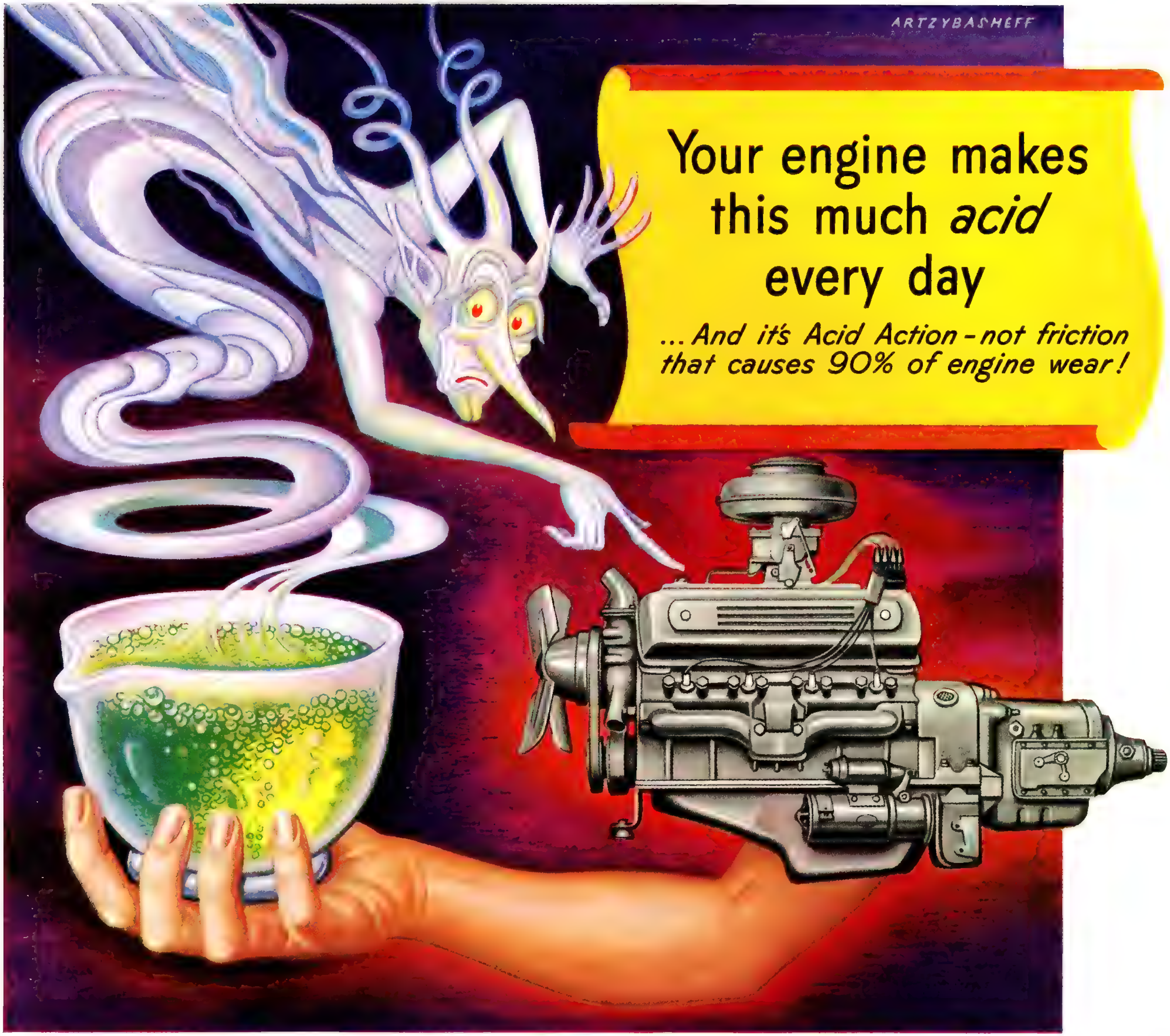
This insurance is also available for fire, windstorm, and other hazards.

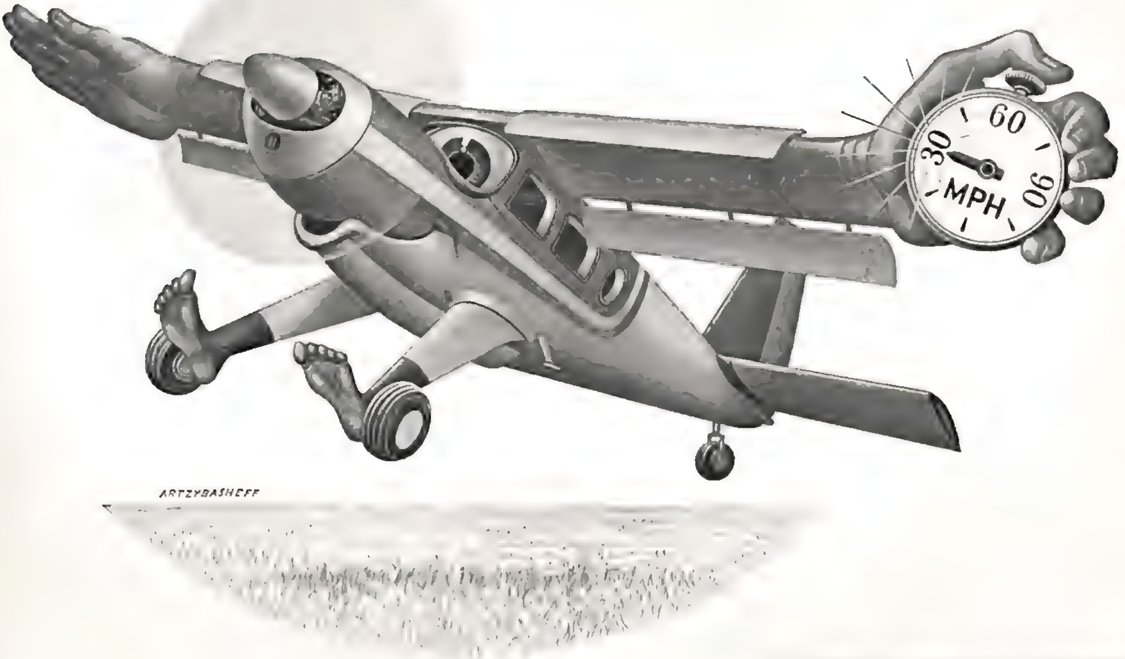
Ask your Travelers agent or broker to tell you more about this important protection for the earning power of your business.

MORAL: INSURE IN *The Travelers*

ALL FORMS OF INSURANCE AND SURETY BONDS

The Travelers Insurance Company, The Travelers Indemnity Company, The Travelers Fire Insurance Company, The Charter Oak Fire Insurance Company, Hartford 15, Connecticut. Serving the needs of the insurance public in the United States since 1864 and in Canada since 1865.


ARTZYBASHEFF
Your engine makes this much *acid* every day
...And it's Acid Action - not friction that causes 90% of engine wear!



New speedster that can "crawl" without "stall"

High-angle climb immediately after take-off is characteristic of the Helio Courier. It seats four . . . is powered by Lycoming's 260-h.p. air-cooled engine.

Send for Free Booklet! "THE LYCOMING STORY" . . . 40 interesting, illustrated pages showing many ways Lycoming is ready to help you. Write for it on your letterhead.

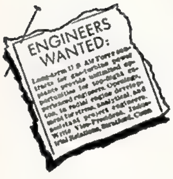
Powered by a dependable Lycoming engine, this executive plane cruises above 150 mph—yet lands at 30 mph.

Now you can fly at 30 mph—with no danger of spin or stall. Take off and land in the "backyard" space of 75 yards. And fly completely *relaxed* in the knowledge that your power plant is a dependable Lycoming air-cooled engine.

Small wonder the Helio Aircraft Corporation expects its advanced design plane to open up a new era in private flying.

Naturally, we are proud that once again Lycoming contributes to aviation progress. Perhaps we can also help meet *your* need for air-cooled power.

Whatever your problem . . . if it can be solved by any of the services listed with our signature . . . *look to Lycoming.*



FOR RESEARCH • FOR PRECISION PRODUCTION

LOOK TO Lycoming

DIVISION OF AVCO STRATFORD, CONN
Manufacturing plants in Stratford, Conn., and Williamsport, Pa.

Aircraft Engines
Industrial and Tank Engines
Engine Overhaul
Generating Units

Turbine Engineering and Research
Engineering Design and Development
Hardened and Ground Precision Parts
Gears and Machine Parts

Complete Assemblies
Heat-Treating and Plating
Steel Fabrication
Castings
Boilers

From Brooklyn to the Battery... the *Hard* Way

Now nearing completion is an engineering feat outstanding in our times . . . the twin-tube Brooklyn-Battery Tunnel. It has taken more than 4 solid years of work. It will cost in the neighborhood of 70 million dollars. It extends 11,100 feet from portal in Brooklyn to portal in Manhattan. It will accommodate 16 million motor vehicles annually. And yet virtually none of the millions who will use it will ever know the names of those who made it possible.

Such is life for the engineers . . . an endless round of similar tasks, now great, now small, often taxing their ingenuity to the utmost, to the end that people may travel more easily, breathe more freely, live better in every way. But an engineer's achievement is not valued for its size, cost or fame . . . rather for what it means for the people who use it. Thus, the work of an unknown engineer may benefit millions of people, but never get a notice in a newspaper. These men do not complain. Their passion is not for publicity but for achievement.

Here too is the reward cherished by the people at Dietzgen who make the things engineers use . . . surveying and drafting instruments, slide rules, blue print and other reproduction papers, some 8,000 items all essential to the execution of engineering concepts. The Dietzgen staff who design and create these products know *their* work is judged by the most discerning jury in the world. How well does Dietzgen serve them? How well do we keep abreast of their challenging requirements? In the constantly growing preference they have shown for Dietzgen products over the past 63 years, we believe we hear their answer.

DIETZGEN

PRECISION EQUIPMENT & SUPPLIES FOR ENGINEERS, ARCHITECTS, DRAFTSMEN, SURVEYORS AND SCIENTISTS . . . .

EUGENE DIETZGEN CO., Chicago • New York • San Francisco • New Orleans • Los Angeles
Pittsburgh • Washington • Philadelphia • Milwaukee • *Dealers in All Principal Cities*

March 1950

…too good to burn!

IT'S COAL — but a very special kind of hard coal from only *one* vein in the country, hand picked by a trained technician. We will bake it, treat it, make it into tiny but perfect carbon granules and put them inside Bell telephones to help turn voice vibrations into electrical impulses.

YOU CAN COUNT on these bits of carbon to last and last . . . and so can your Bell telephone company. This means low upkeep and less cost in the long run; which is the way we want it, too!

SINCE Western Electric is the manufacturing unit of the Bell System, our aim is to produce telephone equipment that won't let you down—and to do it so that the price of telephone service may be as low as possible. That's how Western Electric helps to make your Bell service so good and such a good value.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

Hero of Chicago's Subway

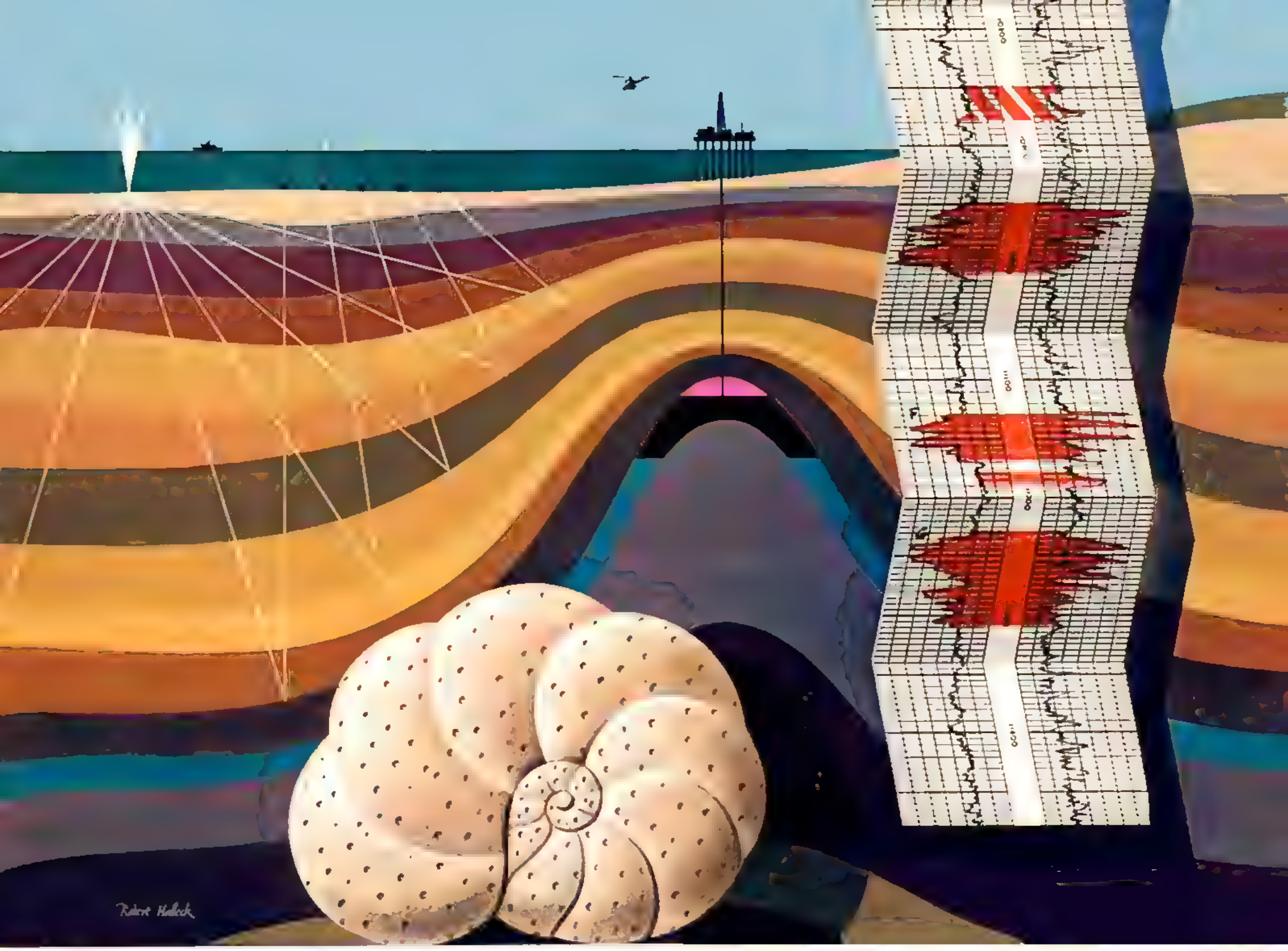
How a tiny switch won honors in a major engineering feat

More than two years ago, the first of a crew of 7000 men disappeared underground through a shaft sunk near the heart of downtown Chicago. Since that time they have hacked and sliced and cut 8½ miles of tunnel out of the stubborn clay beneath some of the world's busiest streets and tallest buildings. And through all those months, between 7000 men and a cave-in of the earth above their steadily lengthening burrow, between that army of workers and sheer disaster, stood a little device scarcely larger than your hand... a Cutler-Hammer Pressure Switch . . . for the roof and walls of the advancing tunnel were held in place during construction not by mighty shoulders of steel but by the pressure of air held *constantly* at 12 pounds above normal.

That so small a mechanism should play so important a part in a major engineering achievement, that the safety of so many lives and so much property was justifiably entrusted to that device, speak volumes for its reliability. But of much greater meaning to any thinking user of Motor Control is the fact that this Cutler-Hammer Pressure Switch, guardian of the Chicago Subway construction, was not special in any way but a *standard* unit of Cutler-Hammer Motor Control purchased directly from a local electrical wholesaler's stock. You, too, will find *dependable* Cutler-Hammer Motor Control for *your* needs a wise investment in security and satisfaction . . . an economy at no extra cost. CUTLER-HAMMER, Inc., *Pioneer Electrical Manufacturers*, 1320 St. Paul Ave., Milwaukee, Wisconsin.

CUTLER-HAMMER
MOTOR CONTROL
C-H

Copyright 1941 Cutler-Hammer, Inc.



Needed in 24 hours: 7,000,000 barrels of oil

Finding new crude takes brains, brawn, science, and luck . . . plus bank credit

The greatest game of hide-and-seek in history is being played from the Canadian border into the Gulf of Mexico. Its object: Find 7 million barrels of oil a day, enough to fill 300 miles of tank cars. For that's what it takes to keep the nation's wheels turning.

Oilmen are smashing records to meet this challenge. During 1956, they brought up oil from 4¼ miles...sank a well 42 miles offshore, another in 112 feet of water . . . and drilled 5,000 new wells a month. All are records!

But it will take more records to satisfy America's demands for 100 billion barrels over the next 25 years. (Three times current known U.S. reserves!) To step up the search, the industry relies on the seismograph and other geophysical "tools"...on faster, deeper drilling techniques...on new methods of recovering "unrecoverable" oil . . . and on the still vital element of luck.

In the face of the great need for petroleum, oilmen require more from banks than loans. They need *bankers* who know the oil industry. That's why oil executives come to First National City's Petroleum Department.

Here they find adequate resources and a combination of banking and petroleum talent that aids in planning and providing for their financial requirements. First National City's banker-engineer teams—working with correspondent banks in oil centers—can offer tailor-made financial services.

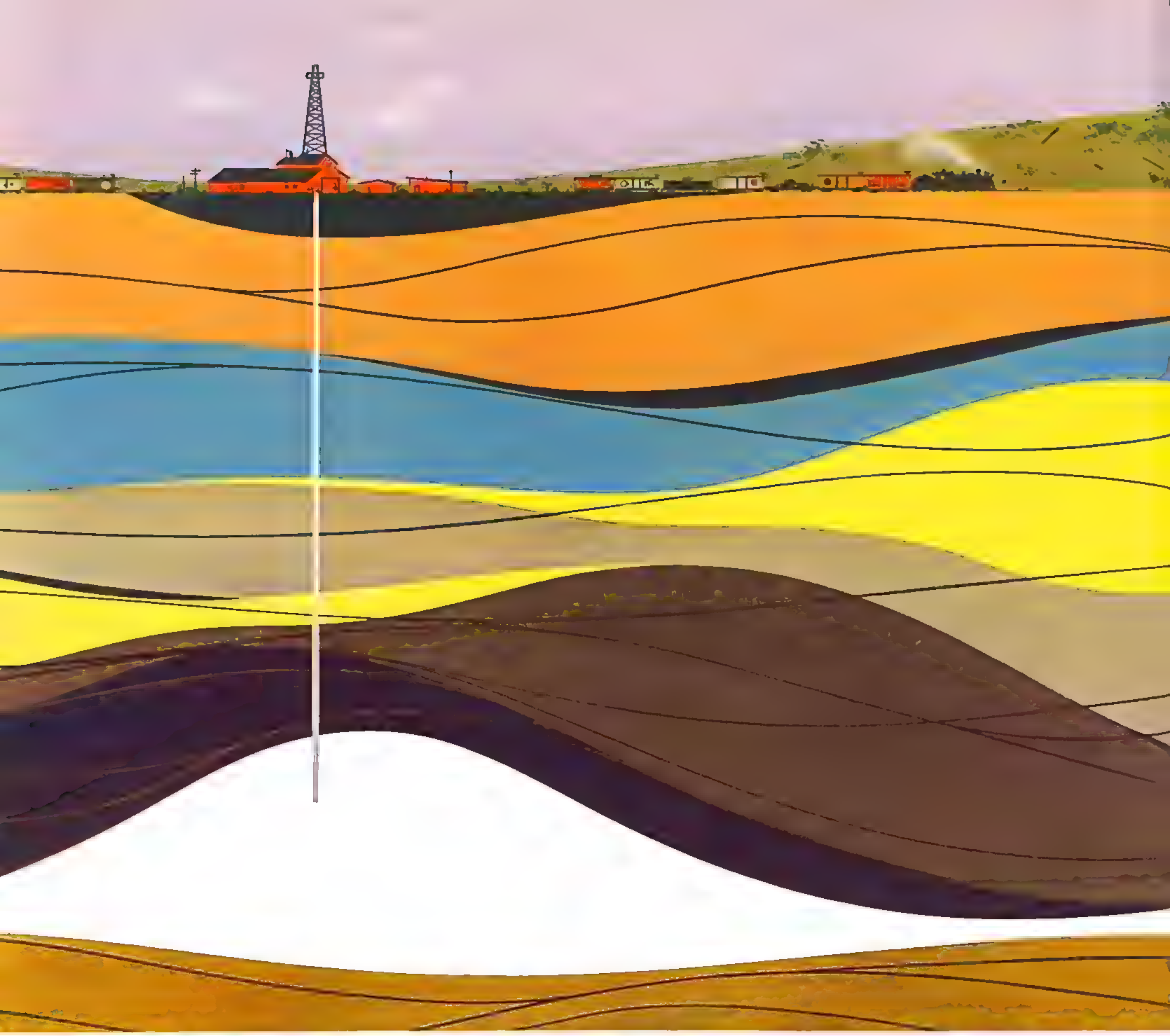
Oil-production loans, for example, facilitate development and the sale and purchase of oil-producing property. Construction loans for refineries, petrochemical plants, pipelines, and marketing facilities aid in plant expansion. Banking services are also available to the industry through our 70 Overseas Branches, Offices, and Affiliates.

Learn how a First National City *banker* can serve your industry.

The **FIRST**
NATIONAL CITY BANK
of New York
First in World Wide Banking
Member Federal Deposit Insurance Corporation

Our 145th Year
1812-1957

WHEN YOU TRAVEL . . . CARRY FIRST NATIONAL CITY TRAVELERS CHECKS . . . SPENDABLE ANYWHERE



At a Midwestern plant, Morton uses wells to force up brine from salt beds 1,000 feet below. From mines and solar ponds, too, Morton sends salt to industry for 14,000 uses.

March 1958

Only Morton can offer you the right salt for every industrial use, coast to coast

From deep drilled wells, from enormous mines, from huge solar ponds, Morton produces salt to help soften water, season food and melt snow; salt to manufacture chemicals and the gasoline that makes your car go.

As the only nation-wide salt company, Morton is able to produce and deliver the kind of salt *you* need, regardless of your size or location.

Nearly 100 different grades

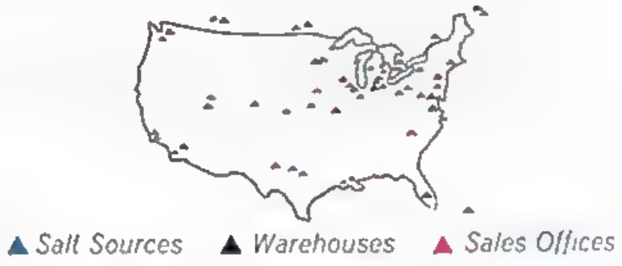
Morton obtains salt from all three sources: mines, wells, and solar ponds. This salt is available in nearly 100 different grades—each with its own peculiarities of purity, shape, texture, and rate of solubility. Morton has mines, wells and solar ponds from coast to coast, and Morton produces all grades of salt.

This is important to you because the right salt for the right job will help you reduce costs, save time, and turn out products of uniform high quality.

How Morton can help you

Morton has the most complete salt research laboratory in the world. Morton also offers a complete line of salt. This means you can get expert, *impartial* advice on which grade or grades will do the best job for you. Salt problems your Morton salesman personally can't solve can be referred to Morton's research laboratory for quick, thorough analysis. This service help you get from Morton may be worth thousands of dollars to you every year.

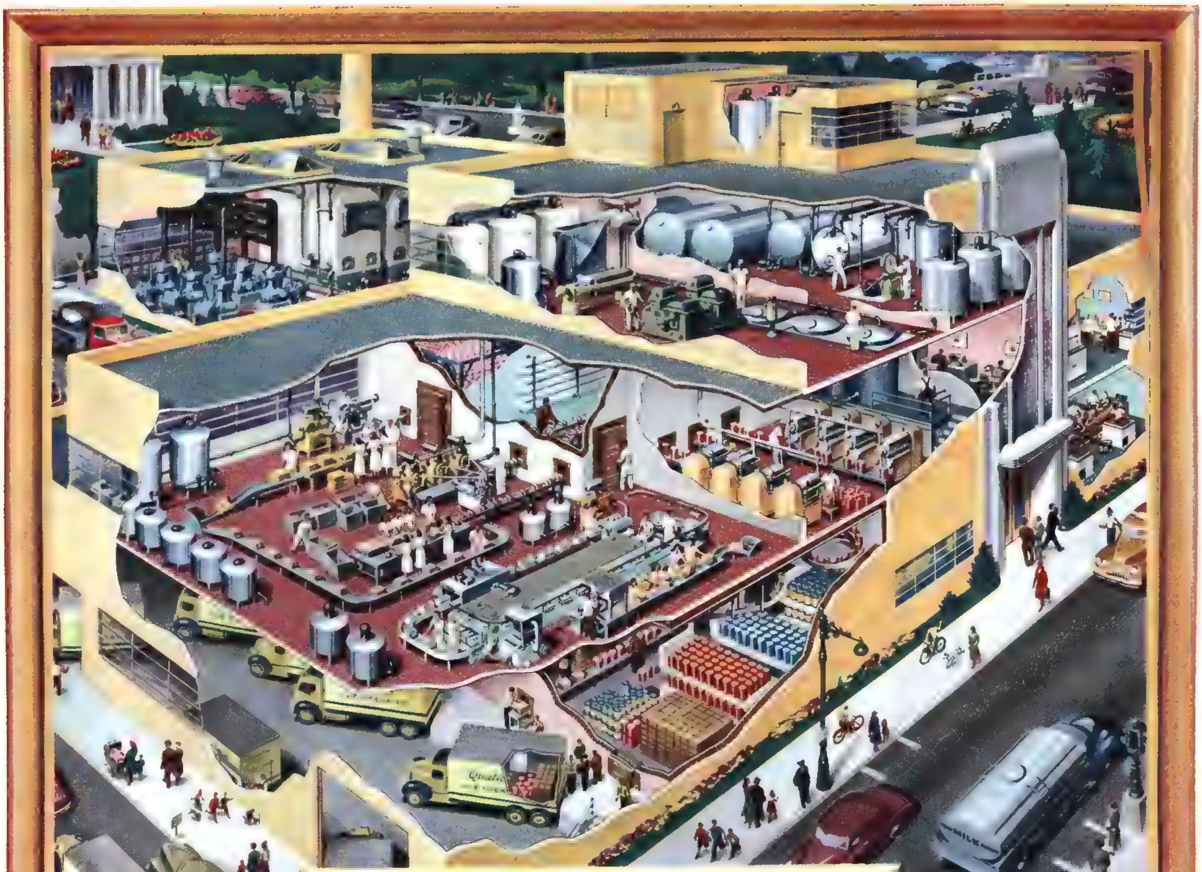
Remember: only Morton is equipped to serve any kind of industry, anywhere in America. Morton has salt sources that span the country, reach into Canada and the Bahamas . . . sales-service offices in all key cities . . . and the world's finest salt research laboratory to serve you. It's easy to see why Morton can save you money with the right salt for the right job at the right time.



MORTON SALT COMPANY
INDUSTRIAL DIVISION
120 So LaSalle Street Chicago 3 Illinois
Telephone FI 6-1300

When it rains it pours

REACH BEYOND TODAY'S BUILDING HORIZON



HOW ICE CREAM IS MADE

Prepared by the Armstrong Cork Company, makers of Industrial Insulations, in cooperation with the International Association of Ice Cream Manufacturers

THEY SAY Dolly Madison introduced ice cream to America. When she first served it at the White House she probably hoped it would become popular, but she never dreamed of the big plants and automatic equipment that now produce thousands of gallons and dozens of flavors. Most likely milk and cream were delivered to Mrs. Madison in a pail. Now big tank trucks 1 bring them to the plant. She had to use milk right away to keep it from spoiling, but today refrigeration and insulation, like Armstrong's Corkboard, around the trucks and storage tanks 2 keep it fresh.

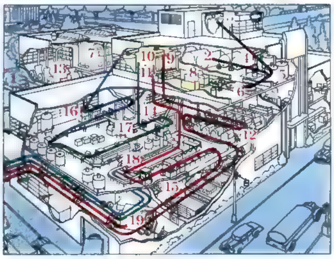
In an ice cream plant, sugar syrup is stored 3 then weighed with the milk and cream 4, mixed together 5, and pasteurized 6 with 160° F. steam. To keep steam hot the pipes that bring it from the boilers 7 are covered with 85% Magnesia insulation. The pasteurized mix 6 is now homogenized 8, cooled 9 to just above freezing, and stored 10.

Mix for bulk ice cream is flavored 11 and partially frozen 12. The refrigerant at 30° below zero supplies the low temperatures for all the refrigerated equipment. This refrigerant is made cold by compressors 13 and kept cold by Armstrong's Cork Covering on the pipes that carry it. Fruit or nuts are added as the ice cream pours into containers. Then it is frozen 14 and stored 15. Both rooms can be held at 20° below zero because the walls, floors, and ceilings are built with Armstrong's Corkboard.

Ice cream rolls 16 and fancy packages of ice cream 17 are formed then wrapped. Ice cream on a stick 18 is frozen in molds by 50° F. below zero brine, then dipped in hot chocolate. Like bulk ice cream these products are hardened 14 and stored 15.

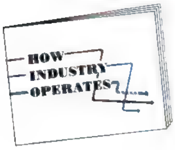
Handling ice cream requires special equipment that's well insulated to prevent thawing. So the delivery trucks 19 and the retail storage cabinets are insulated with Armstrong's Corkboard and Fiberglas.*

Ice cream makers, and many other industries, have relied on Armstrong's Industrial Insulations for over forty years. If you have a problem keeping heat or cold where it belongs, a trained engineer in a near-by Armstrong office will be glad to help you.



■ Raw Mix
Pasteurized Mix
■ Bulk Ice Cream
■ Ice Cream Rolls
■ Brick Ice Cream
■ Ice Cream "Pops"

*®OCF CORP.

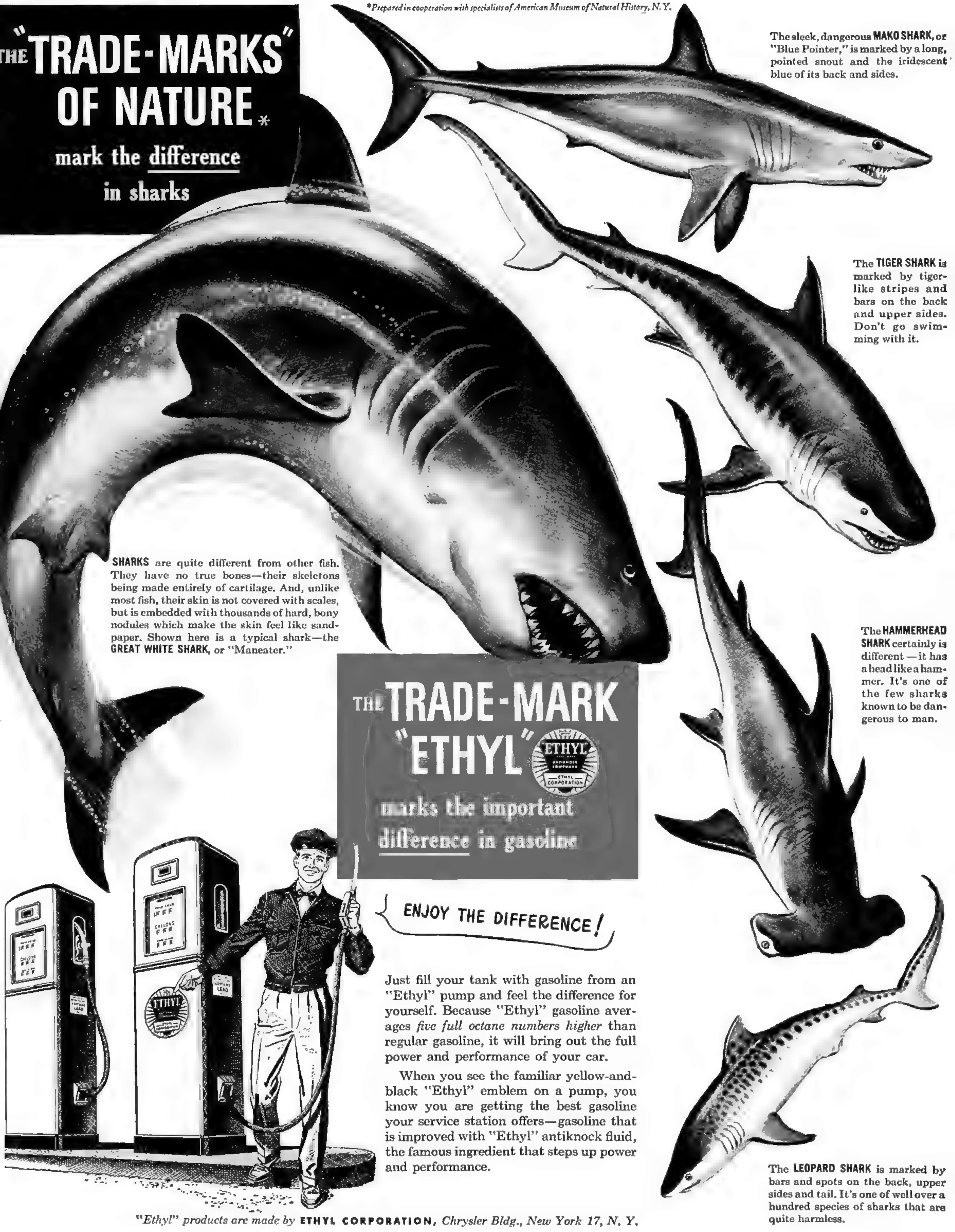


SEND FOR FREE BOOKLET. "How Industry Operates" contains 13 full-color cutaway views of interesting businesses and manufacturing processes. Write to Armstrong Cork Company, 5101 Marietta Ave., Lancaster, Pa., for your copy.

ARMSTRONG'S INDUSTRIAL INSULATIONS

MATERIALS · INSTALLATION

FOR ALL TEMPERATURES FROM 300° F. BELOW ZERO TO 2800° F.



*Prepared in cooperation with specialists of American Museum of Natural History, N. Y.

THE "TRADE-MARKS" OF NATURE*

mark the difference in sharks

The sleek, dangerous **MAKO SHARK,** or "Blue Pointer," is marked by a long, pointed snout and the iridescent blue of its back and sides.

The **TIGER SHARK** is marked by tiger-like stripes and bars on the back and upper sides. Don't go swimming with it.

SHARKS are quite different from other fish. They have no true bones—their skeletons being made entirely of cartilage. And, unlike most fish, their skin is not covered with scales, but is embedded with thousands of hard, bony nodules which make the skin feel like sandpaper. Shown here is a typical shark—the **GREAT WHITE SHARK,** or "Maneater."

The **HAMMERHEAD SHARK** certainly is different — it has a head like a hammer. It's one of the few sharks known to be dangerous to man.

THE TRADE-MARK "ETHYL"

marks the important difference in gasoline

ENJOY THE DIFFERENCE!

Just fill your tank with gasoline from an "Ethyl" pump and feel the difference for yourself. Because "Ethyl" gasoline averages *five full octane numbers higher* than regular gasoline, it will bring out the full power and performance of your car.

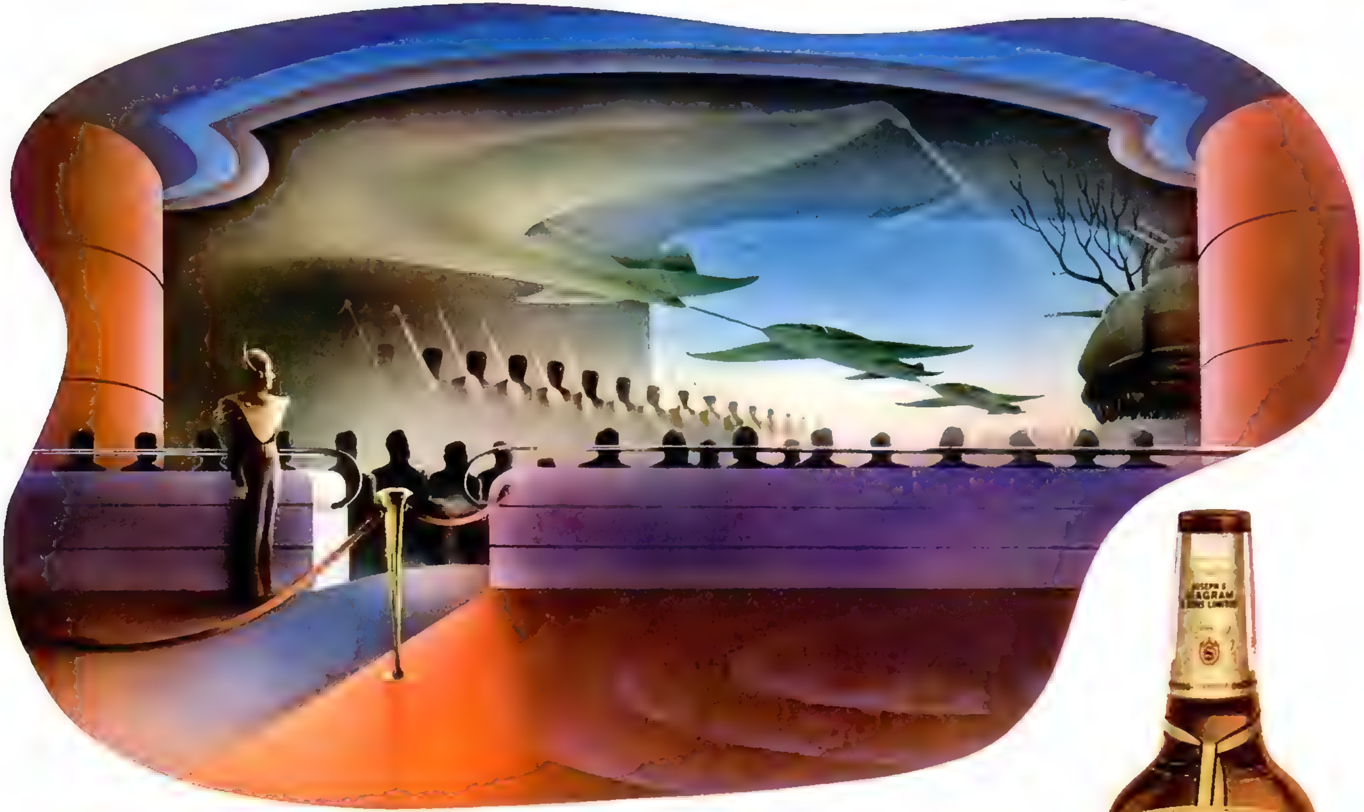
When you see the familiar yellow-and-black "Ethyl" emblem on a pump, you know you are getting the best gasoline your service station offers—gasoline that is improved with "Ethyl" antiknock fluid, the famous ingredient that steps up power and performance.

The **LEOPARD SHARK** is marked by bars and spots on the back, upper sides and tail. It's one of well over a hundred species of sharks that are quite harmless.

"Ethyl" products are made by **ETHYL CORPORATION,** *Chrysler Bldg., New York 17, N. Y.*

LHButcher

Men Who Plan beyond Tomorrow Prefer the World's Lightest Highball!



3-Dimensional Movies—more thrilling than any you ever dreamed of! The people in the picture seem to step right off the screen and pass so close you could touch them. Planes overhead make you think you're seeing real ones . . . and a vast, enthralling spectacle unfolds—so true to life you feel you are witnessing the actual, exciting events. That's the movie of the future, being perfected now by Men Who Plan Beyond Tomorrow!

* * *

DO YOU recall the day six years ago when the Irish Free State became the State of Eire? When "Northwest Passage" was chosen the month's best book? When the "Ranger" won the yacht races from "Endeavour II"? That's the year the rare whiskies in Seagram's V. O. CANADIAN were carefully blended for gracious flavor and stored away to mellow. Through the years these distinguished whiskies have been treasured for *Tomorrow*... so the V. O. of today will always be so smooth, so satisfying, so definitely preferred!

Seagram's V.O. CANADIAN

CANADIAN WHISKY • A BLEND OF RARE SELECTED WHISKIES

Six Years Old—86.8 Proof. Seagram-Distillers Corporation, New York

XR

Enjoy Top News and Sports Events as You Dine

...by Men Who Plan Beyond Tomorrow

Tomorrow's box seats for the things you don't want to miss can be your favorite restaurant, where, on full-scale screens, the game is covered in sight and modulated sound, play by play. Full color television will bring you highlight news...the pageantry of parades...the performances of great stars. All on screens so placed that you can enjoy every scene without shifting your position.

• • •

You can enjoy, too, a whisky not to be compared with any taste you may have known ...very light, very clean-tasting ...a delicate blend of Canada's finest whiskies. Tonight, discover for yourself what hundreds of thousands, at home and abroad, have found these past few years—that Seagram's V.O. Canadian is Canadian whisky at its glorious best—preferred for the world's lightest highball!

Six Years Old—86.8 Proof. Seagram-Distillers Corporation, New York

Seagram's V.O. CANADIAN

CANADIAN WHISKY—A BLEND....OF RARE SELECTED WHISKIES

Men Who Plan beyond Tomorrow Like CANADIAN Whisky at its Glorious Best!

The Rocket Ship of the future—shooting you from Minneapolis to Mandalay in less than half a day! Traveling above the stratosphere, propelled by gases roaring from its tail, this sealed, luxurious carrier will cover regular routes to all the world. It seems a dream today, but it's being talked of *now* by Men Who Plan Beyond Tomorrow!

* * *

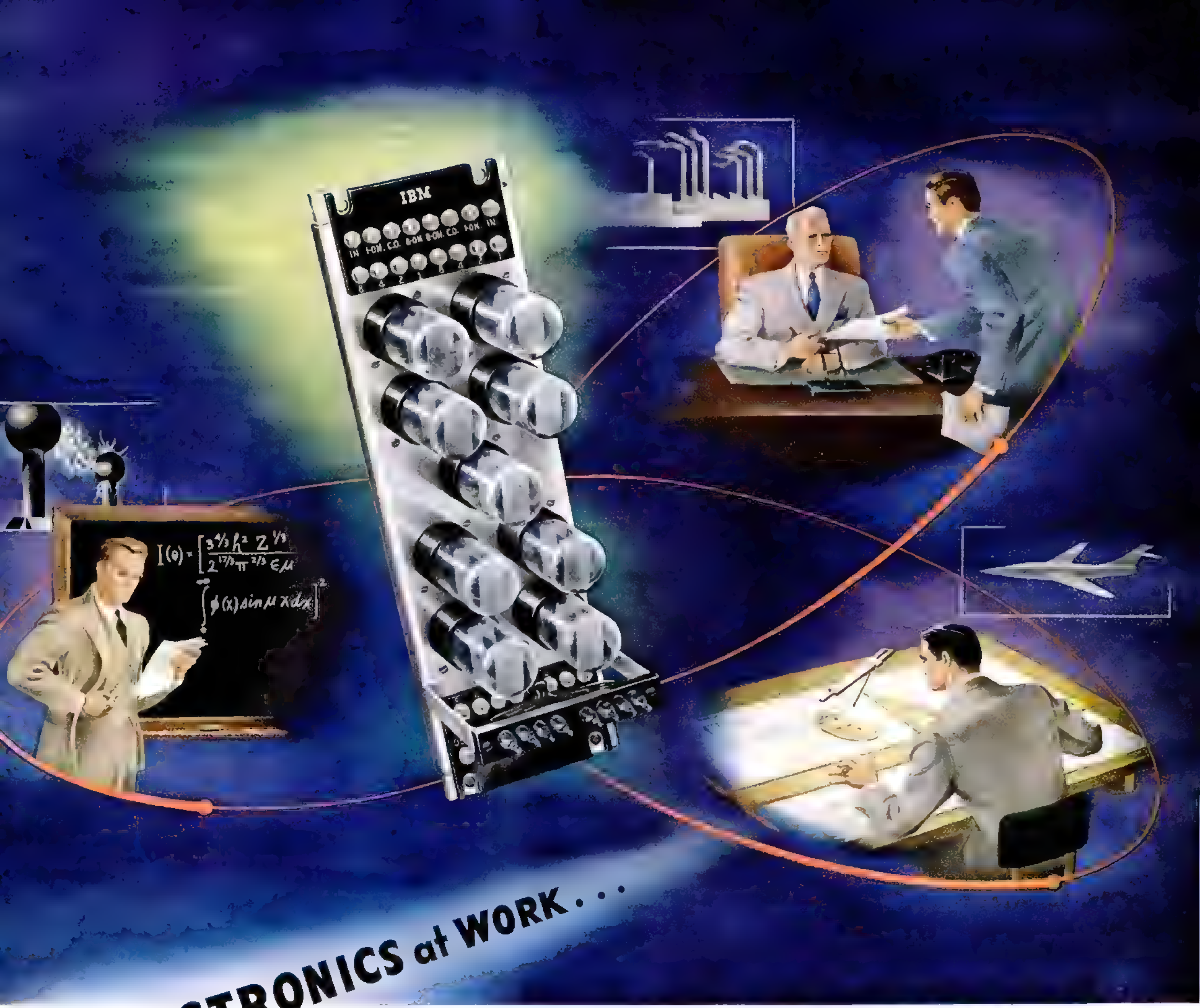
THINK back six years ago to the time when "Emile Zola" came alive on every screen . . . when Egypt first became a member of the League of Nations. Do you realize that Seagram thought of Tomorrow even then? That was the year when the distinguished whiskies in Seagram's V.O. CANADIAN were blended for gracious flavor and laid away to mellow. Ever since then these rare whiskies have been treasured for *Tomorrow*...so the V.O. of today will always be preferred FOR THE WORLD'S LIGHTEST HIGHBALL.

Seagram's V.O. CANADIAN

CANADIAN WHISKY • A BLEND OF RARE SELECTED WHISKIES

Six Years Old — 86.8 Proof. Seagram-Distillers Corporation, New York

XR



ELECTRONICS at WORK . . .

A BUSINESSMAN needs a report on his company's production and inventory position, and he has to have it faster than ever before.

A SCIENTIST, working in the atomic energy field, needs to know the exact effect of relativistic mass increases in the slowing down of fast electrons.

AN AIRCRAFT DESIGNER needs to determine the theoretical stresses and strains brought about by the use of new-type controls on a jet-powered, supersonic plane.

Today, these intricate requirements and countless others are being met at amazingly high speed through the use of IBM Electronic Business Machines.

IBM pioneered in the application of the science of electronics to business machines.... machines which benefit everyone through increasing the productivity of industry and science.

The device shown is the IBM Electronic Counter, basic unit of IBM Electronic Machines which compute arithmetical problems at tremendous speeds.

IBM

INTERNATIONAL BUSINESS MACHINES CORPORATION
World Headquarters Building
590 MADISON AVENUE • NEW YORK 22, NEW YORK

How "Heavenly" {Vacuums / Vitamins} came to Earth

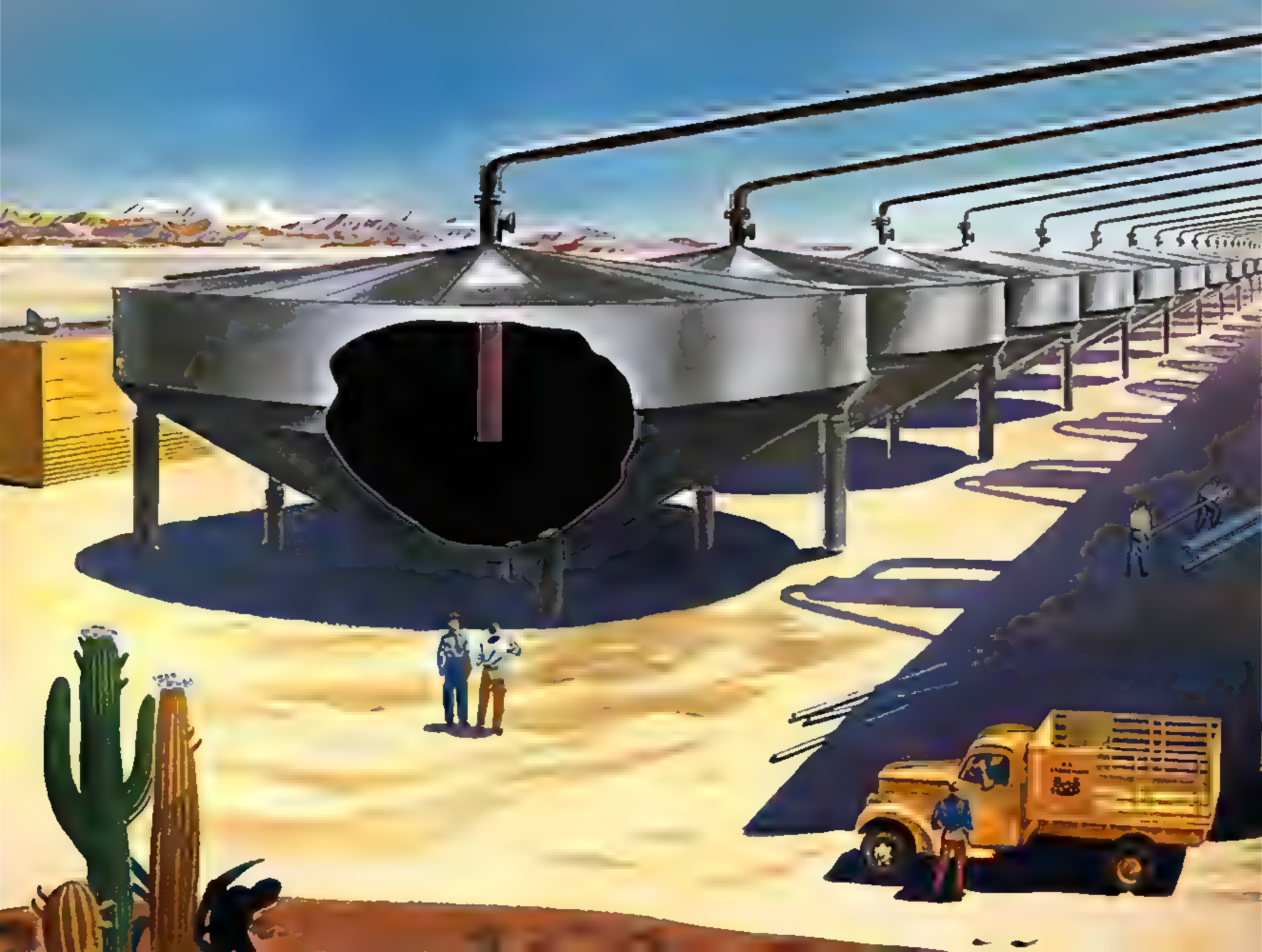
THE WALT DISNEY STORY OF

our friend the ATOM

by Heinz Haber

Illustrated by the WALT DISNEY STUDIO

iodine



On the telephone front...we're ready!

ANY DAY OR NIGHT, anywhere in this country, storm, flood or fire can threaten telephone lines.

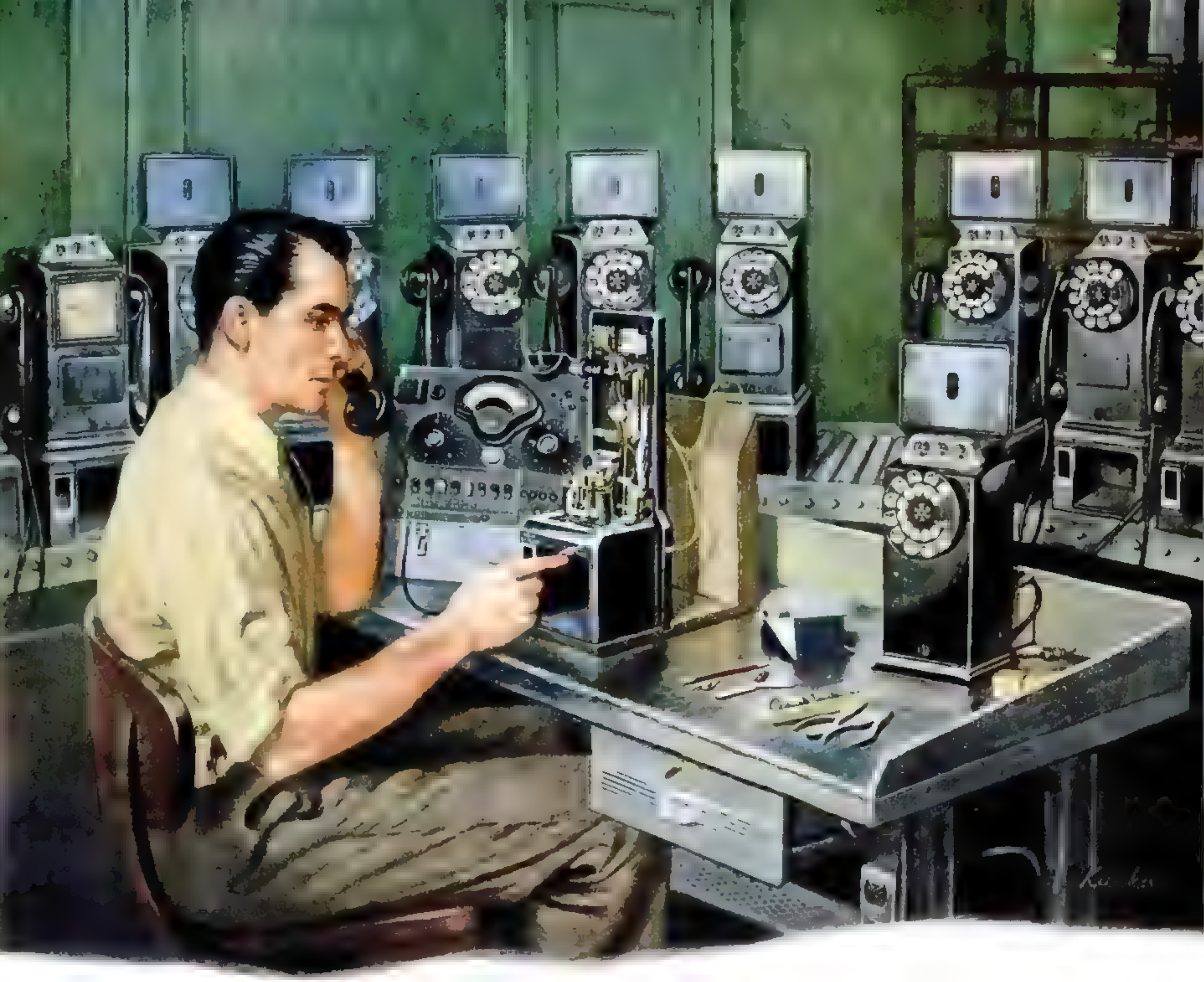
If disaster strikes, Western Electric rushes equipment to the scene at once—wires, poles, cables, crossarms—whatever is needed to help your Bell Telephone company restore service *fast!*

Readiness to meet disaster—as well as daily needs of Bell Telephone companies—is part of Western Electric's job as manufacturer-supplier of the Bell System.

• Western Electric is a unit of the Bell System—has been for 68 years. Our people, who provide telephone equipment and supplies, share naturally in the System's spirit of service that aims to "get the message through" for you—quickly, clearly, and at low cost.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882



MEN SHOT FROM GUNS

● A turbo jet, thrusting an airplane ahead at fantastic speed, leaves a trail of new problems reaching straight back to the research laboratory. How efficient is the power plant? Is fuel wasted? How much?

These are questions of first importance—the turbo jet is a glutton for fuel. Shell scientists, trying to get the answers, experienced some of the confusion and distraction of "men shot from guns." They had to invent new methods—conventional laboratory techniques were lost in the hurricane of speed . . .

They succeeded. They have traced down fuel losses with an accuracy measured in tenths of one per cent, circulated their findings and the news of "how to do it" to the Army, Navy, and turbo jet manufacturers. In this exclusive group the news created a stir!

For if the turbo jet's usefulness is to be extended beyond short range fighters—to military planes of longer range, and commercial aviation—the first, essential step is to get every possible mile out of every drop of fuel.

In the inferno of the combustion chamber, air mixes with the gases of burning fuel—the ratio of air to fuel ranging from 15 to 1, to 200 to 1. The blast of the burned air-fuel mixture shoots from the jet at terrific speed.

Shell scientists' problem: capture a "sample" of the exhaust gases. Analyze them to determine ratio of air to fuel. Then, out of the gases, capture the *unburned* fuel, measure the amount.

Their method of getting a sample was successful from the start—and they have since cut the time required for analysis from 3 hours down to 10 minutes! . . . This practically amounts to "continuous recording" of combustion efficiency.

Accurate measurement of fuel losses in turbo jets is only one research achievement by which Shell demonstrates leadership in the petroleum industry, and in petroleum products. Wherever you see the Shell name and trade mark, Shell Research is your guarantee of quality.

Out of leadership in Research
. . . Shell Premium Gasoline

You share the advancing knowledge of Shell scientists with every purchase of Shell Premium Gasoline.

SHELL

Horizons widen
through
Shell Research

© [illegible], SHELL OIL COMPANY
Incorporated

A. O. Smith Corporation, the world's largest maker of glass-lined water heaters, solved a costly tool problem with a product of Shell Research.

No drop in the bucket

FROM LATHERING UP for the morning shave, to getting the dinner dishes done, the average American family uses 75 gallons of hot water a day. And that's no drop in the bucket.

This great need is supplied for millions of families with "Permaglas" water heaters made by A. O. Smith Corporation. In one of its major plants, however, the manufacturer encountered costly metal cutting problems that shortened the life of expensive tools and slowed production.

Shell industrial engineers were called in. They carefully studied cutting and drilling operations. Their recommendation—Shell Dromus Oil—solved the tool problem by eliminating excessive heat, preventing wear.

Developing better products that speed the work of industry is one way Shell Research works to bring you more for your money wherever you see the Shell name and trademark.

SHELL

Leaders in Industry rely on Shell Industrial Products

© 1958, SHELL OIL COMPANY

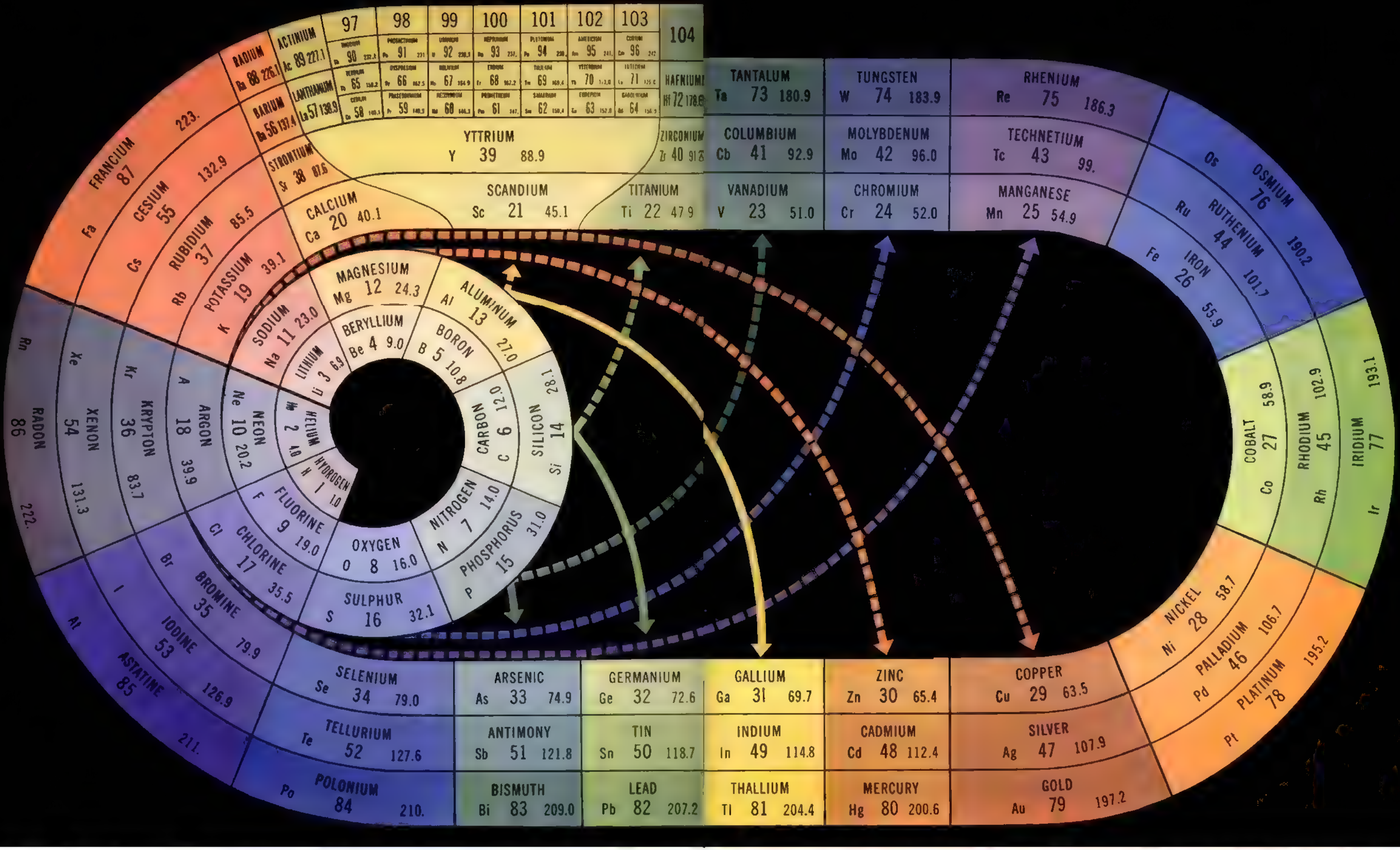


TABLE OF THE ELEMENTS

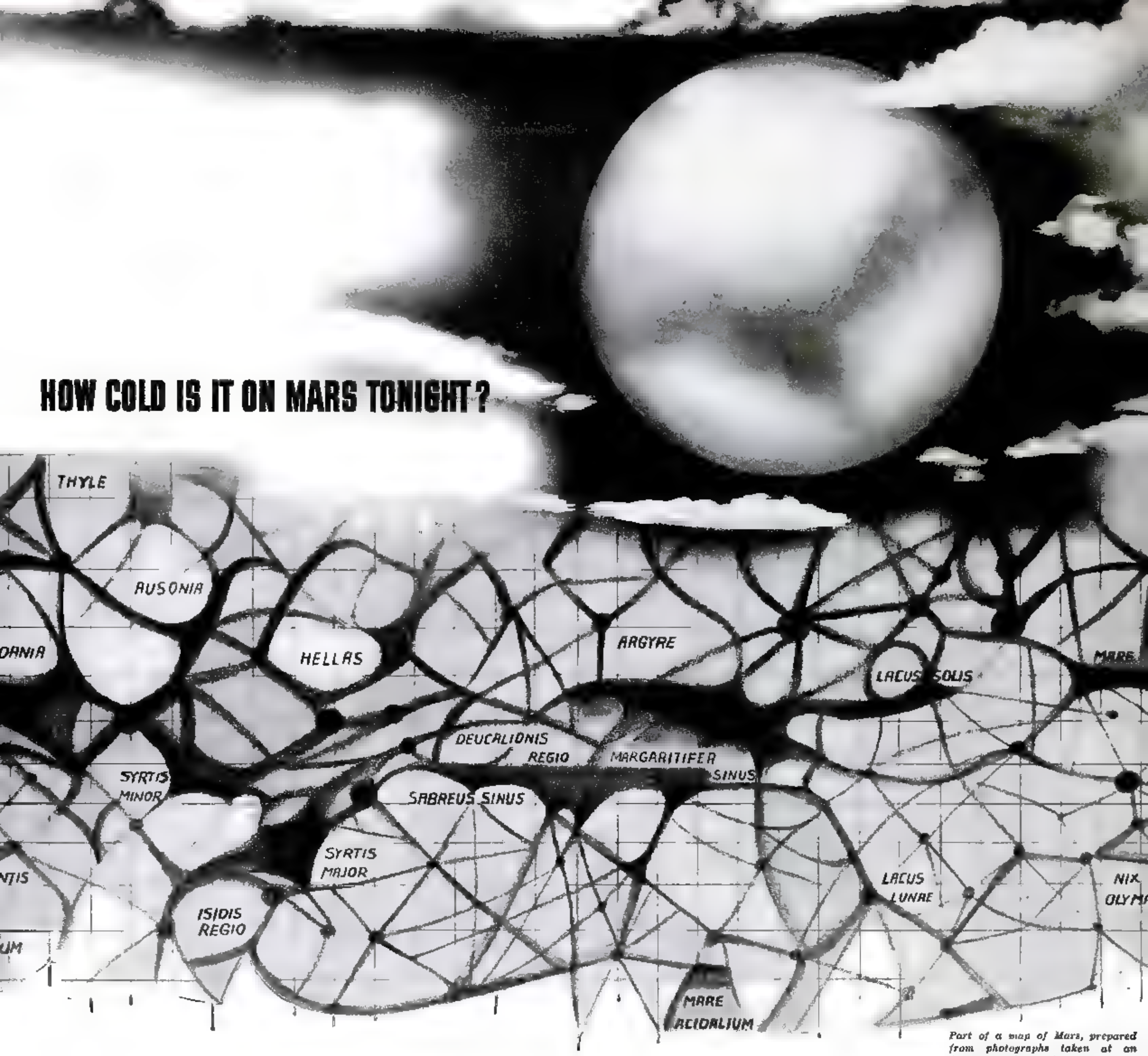
The irregular spiral above is a systematic arrangement of the 92 natural elements, the four new elements so far created by man and eight more elements which it is theoretically possible to create. It is called the periodic table of the elements. The sequence begins with hydrogen (at center of the spiral), which is the first and simplest element. Under its name appears its chemical symbol *(left)*, its atomic weight *(right)* and a larger numeral which gives the total number of electrons in its atom. It is on the basis of this number that the elements are arranged in sequence: after hydrogen, with its single electron, come helium with two, lithium with three, beryllium with four and so on around the spiral.

The colors and construction of the table express another kind of relationship among the elements: the repetition, at regular intervals, of the chemical properties of the first few. Characteristics are thus repeated periodically in the progression from the simplest to the most complex. The table is so organized that elements whose chemistry is almost identical are grouped together in blocks or connected by solid arrows (all the inert gases—helium, neon, etc.—fall in the single gray block at the left). Broken arrows relate groups of elements which are similar in most respects but differ in a few of their properties. All related elements are given different shades of the same color. The key to this similarity among elements is found in the arrangement rather than the number of the electrons in their atoms. Only the electrons in the outer shell affect an atom's chemical nature. Therefore all elements whose atoms have identical outer shells are chemically related, regardless of the total number of electrons which each of them may possess. For example, lithium, sodium and the other elements in the red segment at left all have one electron in their outer shells and are therefore similar though they differ in the total number of their electrons. Each complete circuit of the table starts with one of these elements and ends with an element in the adjacent gray segment whose atom's outer shell is complete.

This table, like all attempts to reduce the basic phenomena of nature to a simple pattern, falls somewhat short of its objective. For one thing, there are variations in the sequence of elements which do not fit readily into its graphic form. For another, it is not so much a simplification as an orderly presentation which specifies the relationship between elements but leaves much about them to be explained (*text, three pages further on*). Yet in expressing this relationship the table reveals the extraordinary symmetry and order which underlie the universe.

COPYWRITTEN MATERIAL

HOW COLD IS IT ON MARS TONIGHT?



Part of a map of Mars, prepared from photographs taken at an American observatory. Temperatures on Mars will vary from 40° F. above zero to about 150° below zero.

Perhaps that may seem a trivial question to you. Yet for centuries, scientists have been trying to unlock the secrets hidden in the dark reaches of the Universe. Secrets which some day may change the whole course of human existence.

Today, truly amazing instruments are measuring sun, moon and stars. Among them are the Farnsworth Photo-Cell Multiplier Tube and Dissector Tube . . . used by scientists to help push time and space aside, and bring new worlds in sharper, clearer focus. These tubes, and many other discoveries in the field of electronics, have resulted from Farnsworth's 15 years of research in television.

With our nation at war, the Farnsworth laboratories are now devoting their skill to the development of new weapons for our armed forces. The great Farnsworth plants, with thousands of employees and 10 years' experience in the manufacture of the famous Capehart Phonograph-Radio, are producing precision electronic instruments in endless stream.

But progress in television is still proceeding! This is one of the world's great industries, destined to play a magnificent part in our national post-war economy.

How far off is that day, no one knows. But your purchase of War Bonds *today* will bring it nearer! And you will be building soundly for the future, when the purchase of an airplane, a motor car, a television set, or perhaps a new home may be your urgent desire.

Meanwhile, Farnsworth is steadily marching toward the day when the realm of science, the news of the day, the music of life will appear on a magic screen *in your own home.*

President
Farnsworth Television & Radio Corporation
Fort Wayne, Indiana

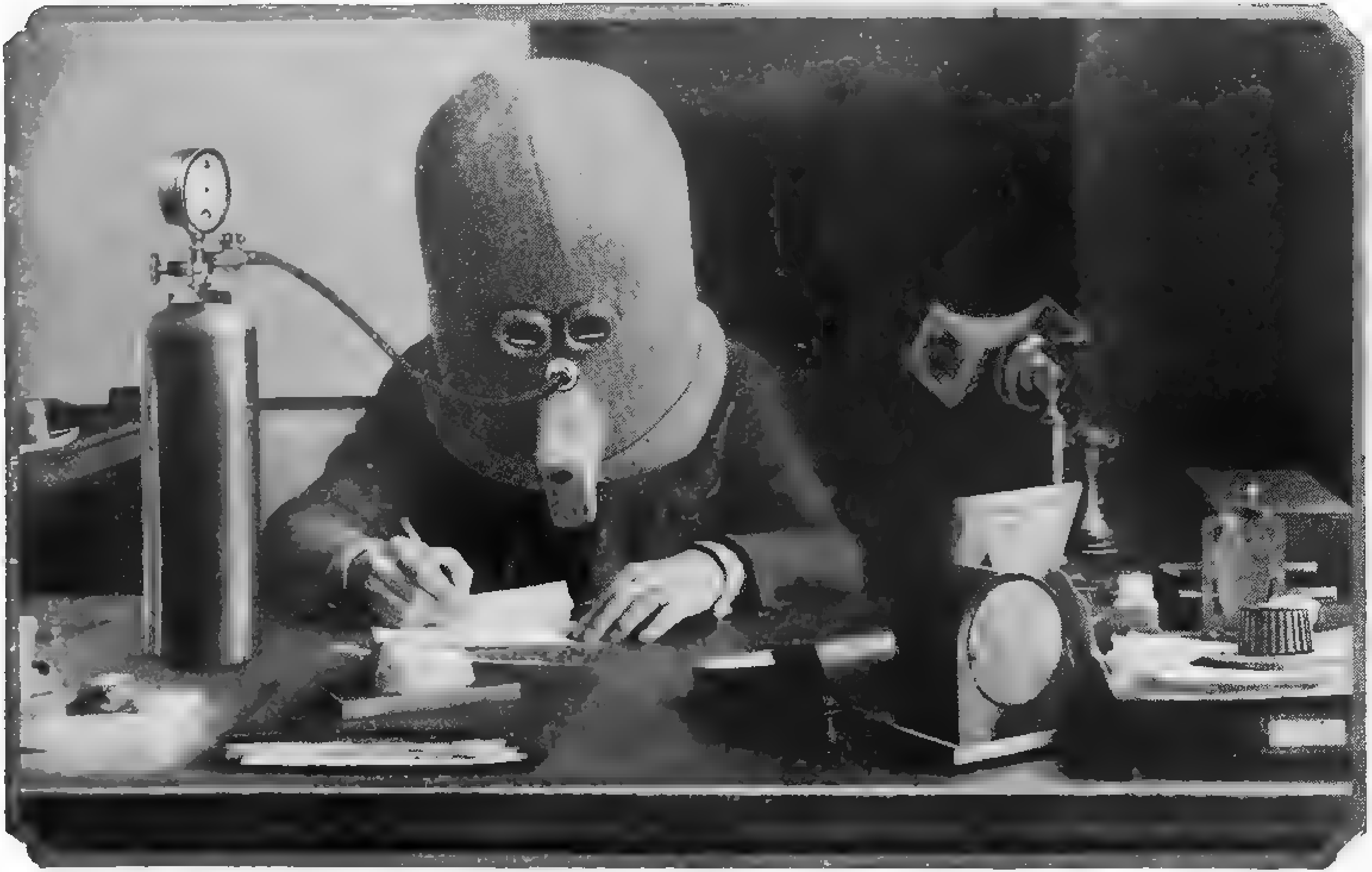
• Manufacturers of Radio and Television Transmitters and Receivers; Aircraft Radio Equipment; the Farnsworth Dissector Tube; the Capehart, the Capehart-Panamuse, and the Farnsworth Phonograph-Radios

FARNSWORTH TELEVISION

The Isolator

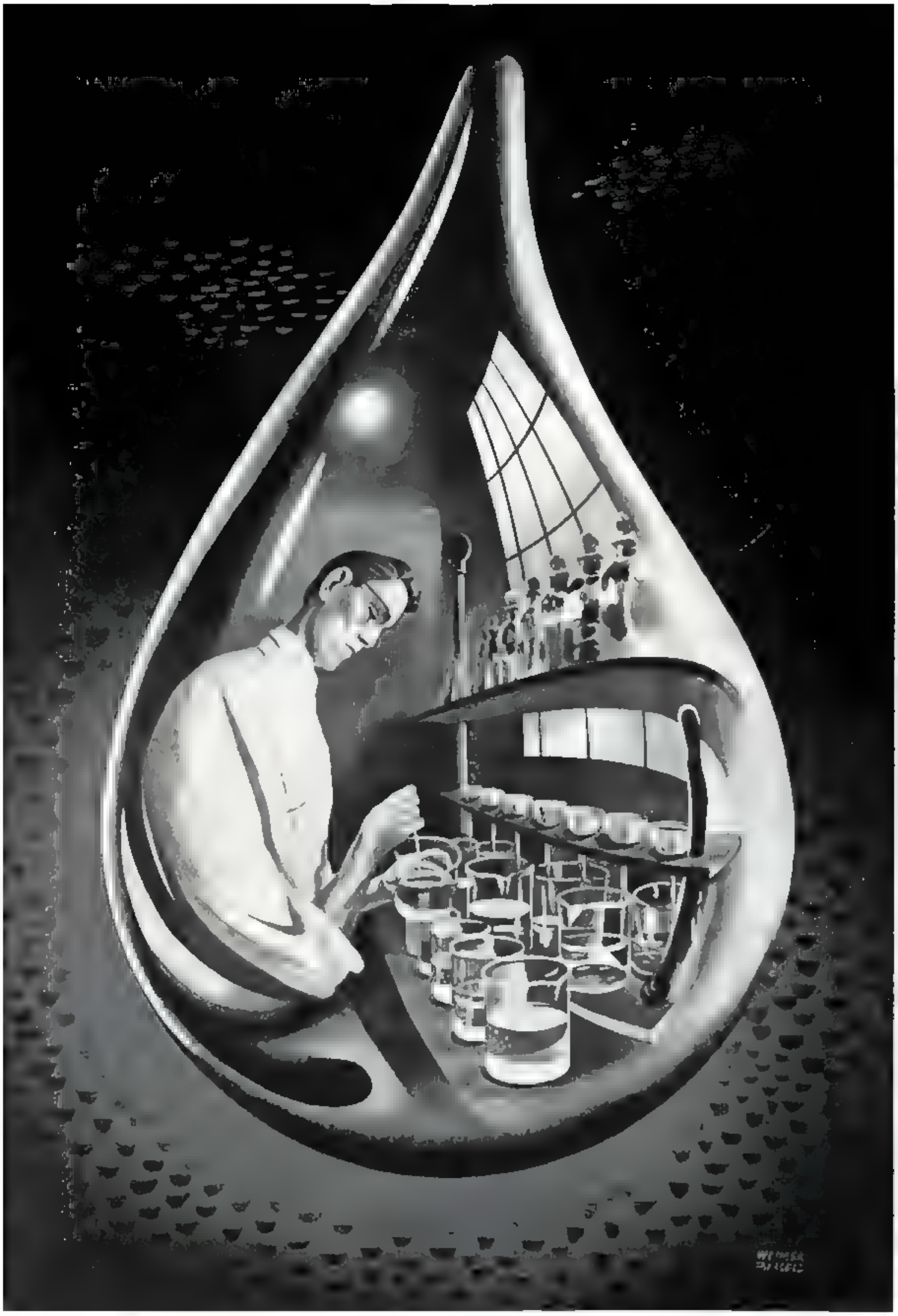
By HUGO GERNSBACK

MEMBER AMERICAN PHYSICAL SOCIETY



The author at work in his private study aided by the Isolator. Outside noises being eliminated, the worker can concentrate with ease upon the subject at hand.

The water drop that couldn't keep its secret



IT had a secret all right. One that defied all the previously known science of detection and control.

For this tiny drop of water . . . and countless billions like it . . . when subjected to the conditions of high temperatures and high pressures in modern steam power plants, exhibits qualities so destructive to the steel walls of boiler tubes that at any moment they may disastrously fail.

No wonder power plant engineers, plagued by this constant threat of boiler shut down, turned to water conditioning chemists and said, "what has happened to your boasted knowledge of water conditioning? Have you come to the end of your rope?"

Fortunately, the laboratories of Hagan Corporation, which for twenty years had pioneered in the science of water conditioning for industrial uses, were already at work on the *new* problem. Then, one day, after two years of experiment and one year of full scale boiler operation, they *knew* they had the answer—a revolutionary water treatment for the particular conditions arising from today's steam power needs—The Hall P-T-X System.*

Hailed as the most fundamental development ever made for appropriately controlling the relationships of boiler metal and water at the high temperatures and pressures of steam power plants, the Hall P-T-X System offers freedom from the many problems originating in the steam-water interfaces of the system, among them boiler metal corrosion and scale.

This is the sort of result engineers have learned to expect from the world's foremost authorities on water treatment. And it is the best of all reasons why, when you face any water conditioning need in your own plant, it will pay you to consult these experts. Address Hagan Corporation, Hagan Building, Pittsburgh 30, Pa.

**A complete technical explanation of this revolutionary development is now being printed. A copy will be forwarded on request.*

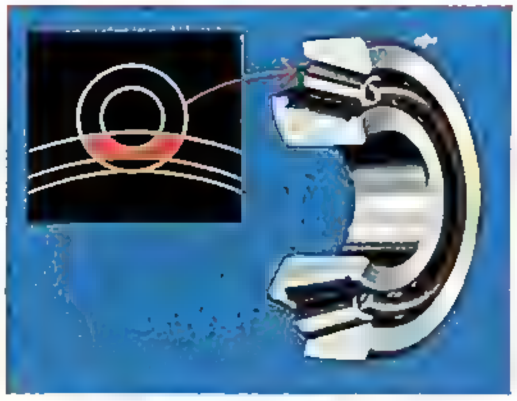
HAGAN
CORPORATION AND SUBSIDIARIES
HALL LABORATORIES, INC.
CALGON, INC.
Industrial combustion and chemical engineers

how tractors mine Uranium for ATOMIC ENERGY

Doing a giant job of cutting "downtime"!

Ever watch a rugged 'dozer go to work? The toughest jobs look like pushovers—*and they are!* These mighty machines—built to literally "move mountains"—use bearings that are *engineered* for punishment. That's why you'll find dependable Bower Spher-O-Honed Bearings on so many makes—cutting maintenance to the bone. In fact, *wherever* bearings are used, Bower-developed design features—like those shown at right—are making bearings last longer and perform better. Whether you use tapered, straight or journal roller bearings, specify Bower! You can *depend* on Bower's consistently higher product quality, long engineering experience and modern production facilities.

BOWER ROLLER BEARING COMPANY • DETROIT 14, MICHIGAN



HIGHER FLANGE REDUCES WEAR

As shown by the red area above, the higher flange provides a large two-zone contact area for the roller heads. This greatly reduces wear—improves roller alignment. Larger oil groove provides positive lubrication where it counts most.

BOWER ROLLER BEARINGS

WHEN DREAM SHIPS COME TRUE—

For those who like to take their ocean voyages at high speed but do not wish to relinquish such luxuries as swimming pools, orchestras and sun decks, etc., the following might be a solution. Why not giant, jet-propelled ships which could provide the desired comforts and at the same time have the faster speed? Such developments as this and a thousand others call for the use of light alloys — aluminum and magnesium — as produced by the Bohn organization. Bohn engineers and production experts have the "Know-how" — can give expert advice on the many advantages of light alloys. Consult Bohn first.

BOHN ALUMINUM & BRASS CORPORATION

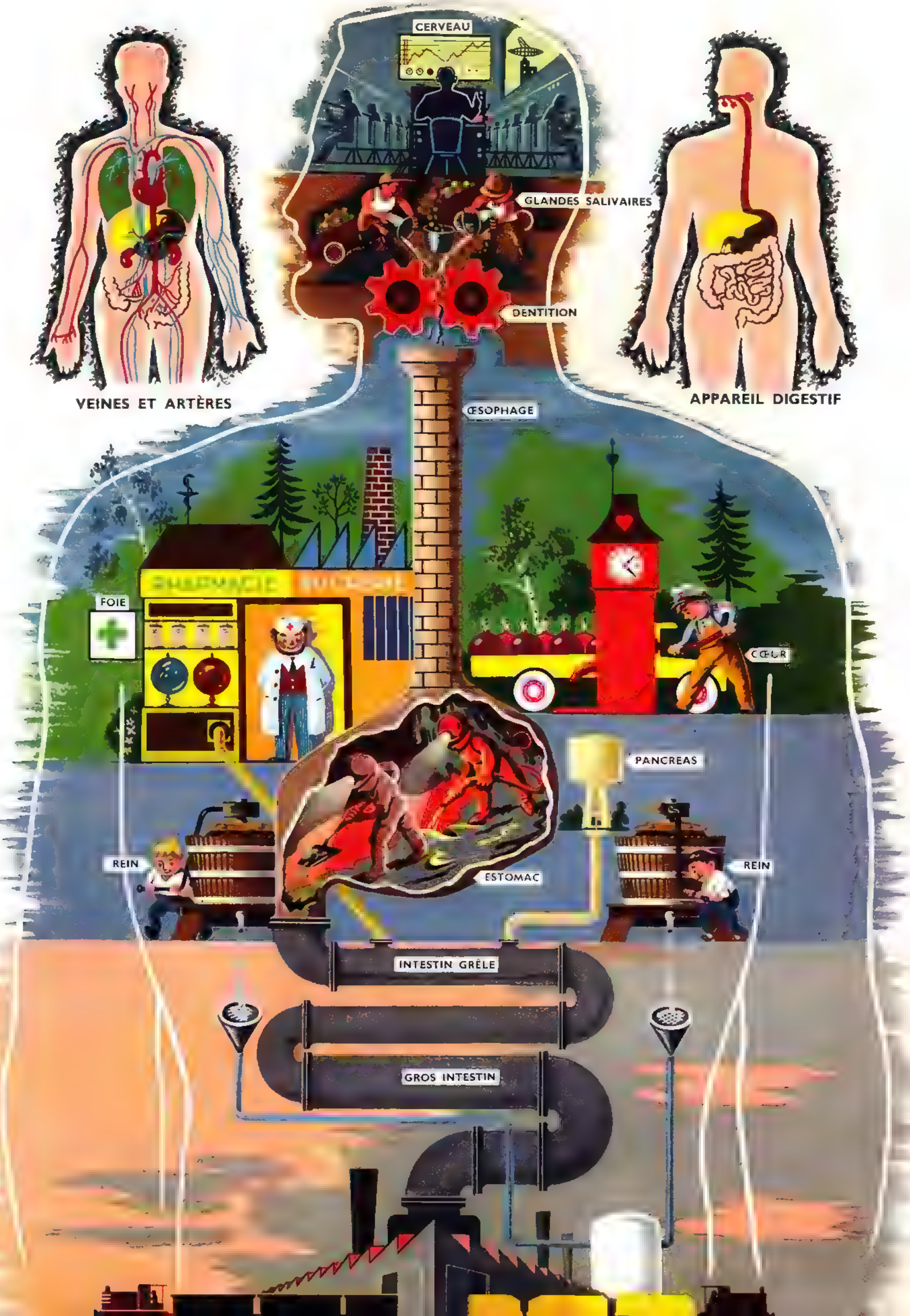
GENERAL OFFICES—LAFAYETTE BUILDING • DETROIT 26, MICHIGAN

Designers and Fabricators—ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

The
HOW
AND
WHY
Wonder Book of

BEGINNING SCIENCE

Deluxe Edition


CERVEAU
GLANDES SALIVAIRES
DENTITION
VEINES ET ARTÈRES
APPAREIL DIGESTIF
ŒSOPHAGE
PHARMACIE
FOIE
CŒUR
PANCREAS
REIN
ESTOMAC
REIN
INTESTIN GRÊLE
GROS INTESTIN

Fortune

OCTOBER 1947

BOOM ON THE FARM

...a hand in things to come

Giving strawberries their place in the sun

Strawberries grow rich and ripe in the sunshine, but they do need special care. Berries that touch the earth can develop ground rot, and the sun itself bakes moisture from the soil. Today, many farmers solve these problems with something you can try in your own garden—black polyethylene film from Union Carbide. Easily rolled out in long strips, this mulch protects the berries from ground rot, helps keep the earth warm and moist, and smothers troublesome weeds in darkness. Tomatoes, melons, peppers and many other fruit and vegetable plants—set in the ground through the film—grow with spectacular results . . . yielding a richer and earlier harvest.

Acres of plastic film are being used on the farm in many other ways. Sheets of vinyl, another Union Carbide plastic, serve as a lining in ponds and irrigation ditches to prevent seepage. Silos of polyethylene film can be set up right in the field as a convenient way to preserve animal feed. *And*, anyone can use transparent polyethylene, stretched over a wood frame, to make a low-cost, do-it-yourself greenhouse.

These BAKELITE and VISQUEEN brand plastics, which are helping to bring you a better supply of food, have sprung from a constant search for new and unusual materials. Pioneers in plastics for 50 years, the people of Union Carbide will continue to provide more and more things to enrich our lives.

Learn about the exciting work going on now in plastics, carbons, chemicals, gases, metals, and nuclear energy. Write for "Products and Processes" Booklet M, Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada, Union Carbide Canada Limited, Toronto.

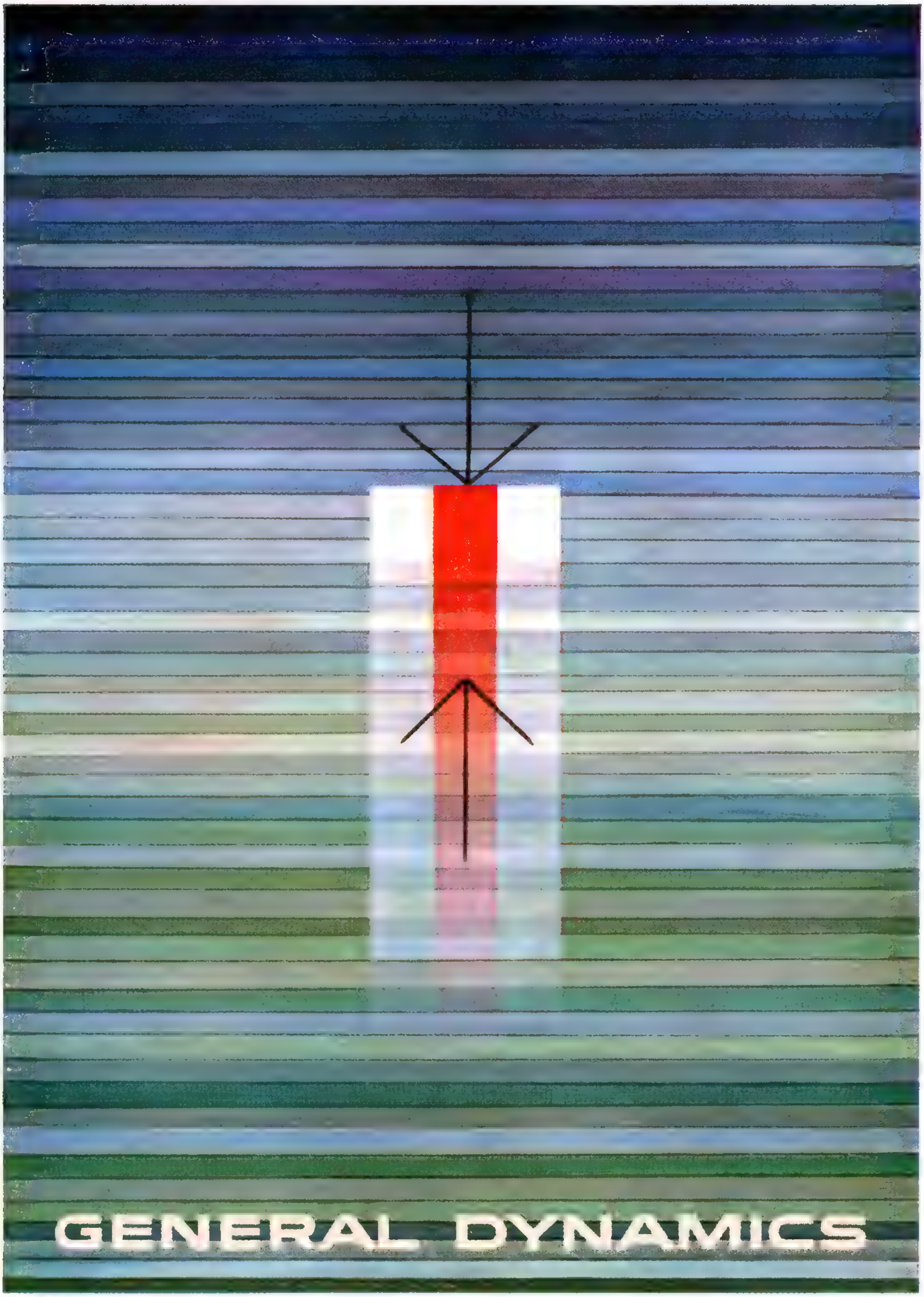
UNION CARBIDE

...a hand in things to come

*The terms BAKELITE and VISQUEEN are registered trade marks of Union Carbide Corporation.

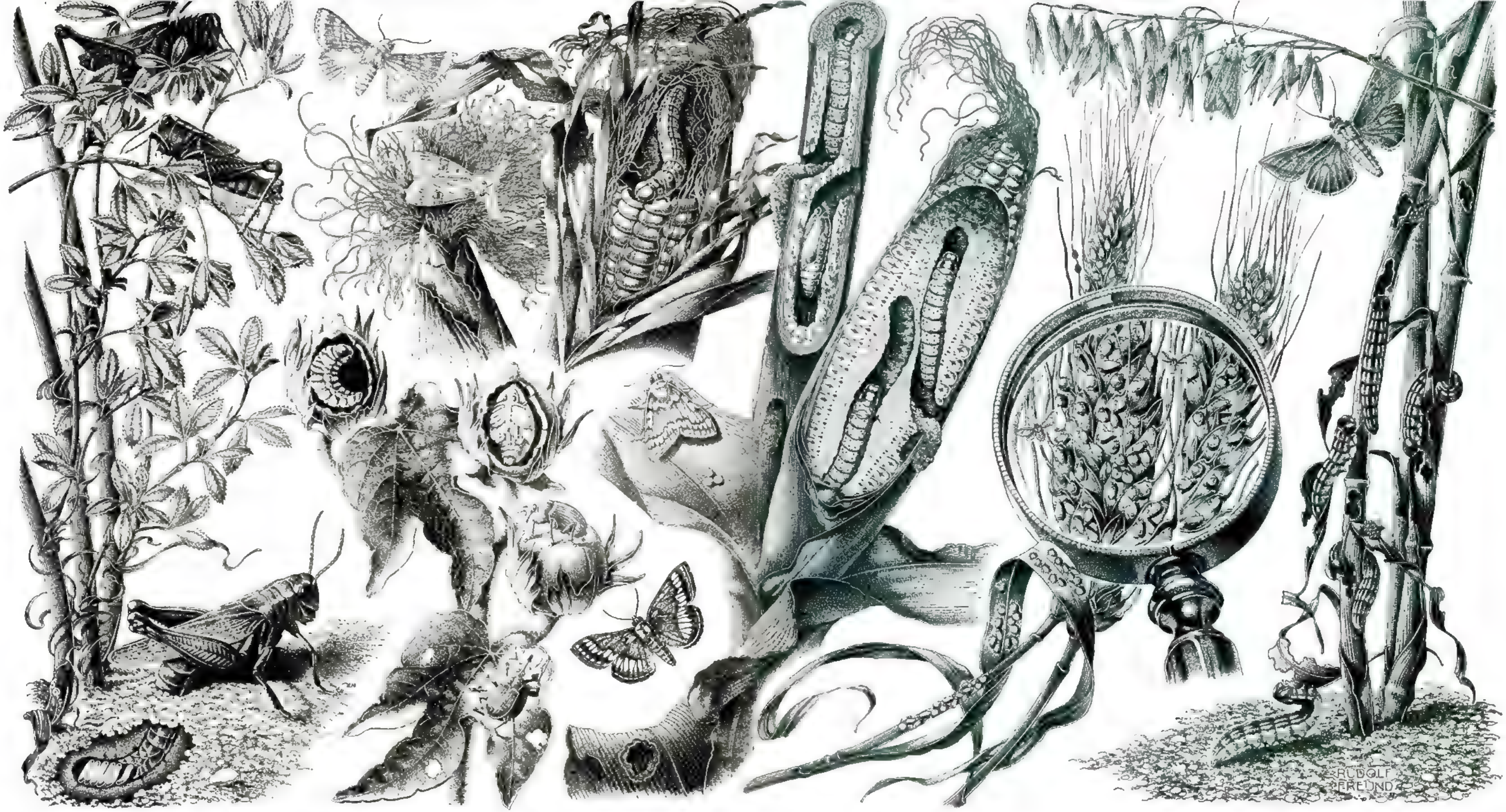
Exploring the Universe: The 4th State of Matter.... Earth is composed of three states of matter, liquid, solid, gaseous. Yet most of the universe exists as the fourth state of matter, the *plasma* state. The bright suns and stars are plasmas — roving, unattached, electrified particles of matter that fuse into new particles on collision, releasing enormous energy. A hydrogen bomb explosion is an *uncontrolled* fusion of plasma particles. We seek now to *control* fusion — to create here on earth the plasmas of suns and stars — to light for all men and all nations fires of boundless energy and endless age.

In a unique scientist-engineer-industry enterprise, General Atomic Division and the Texas Atomic Energy Research Foundation are carrying out the world's first large-scale private industry program leading to utilization of the fourth state of matter—controlled nuclear fusion.



GENERAL DYNAMICS CORPORATION • 445 PARK AVENUE, NEW YORK 22, N. Y.

GD GENERAL DYNAMICS
C-L CANADAIR LIMITED
EB ELECTRIC BOAT
GA GENERAL ATOMIC
ED ELECTRO DYNAMIC
C-V CONVAIR
S-C STROMBERG-CARLSON
LC LIQUID CARBONIC



GRASSHOPPER, expected to do most of this year's crop damage, has voracious appetite for grains, grasses and alfalfa (*above*). The eggs are deposited in the ground in late summer. Young hoppers, fully formed but wingless, hatch out in spring and immediately attack nearby vegetation. These and the other insects shown in this drawing are enlarged almost 50%.

BOLL WEEVIL is second in destructiveness. Female deposits egg in immature cotton boll (shown here half scale), where it hatches into wormlike larva. Larva eats boll's interior, then becomes a motionless pupa which soon develops into a beetle, chews out of its boll and (if female) goes on to lay eggs in another. Several generations are hatched out each summer.

CORN EARWORM eats corn ears, as well as cotton, tomatoes and other vegetables. It hatches from egg laid by female moth in the silk. The worm eats its way down through the ear. When fully grown it chews through husk and drops to the ground, then burrows into the earth where it becomes a pupa. It emerges as a moth in days or months, depending on the season.

EUROPEAN BORER, also the larva of a moth, hatches out of egg laid on a corn leaf. Borer tunnels into the corn stalk or ear, where it hibernates during the winter and feeds in the spring. Main damage is due to weakening of stalk by borers' tunnels so that it bends or breaks off. In the summer the grub becomes a pupa, then changes into an adult moth.

GREENBUG, a major threat to wheat and other grains, is a soft bodied plant louse about 1/16 of an inch long. Eggs laid in the fall hatch in spring, produce fat, wingless creatures called stem mothers, which give birth to several batches of living young, many of them winged. These in turn lay eggs which mature during winter. Greenbugs suck sap, stunt plant growth, carry diseases.

ARMYWORM is the larva of a miller moth which lays its eggs at night on grains and grasses. The egg changes into a tiny green caterpillar which stays near the ground until half grown. Then worm sets forth army-fashion with thousands of others, chewing up leaves and seeds of oats (*above*) and other small grains. Fully grown, it enters the ground, emerges as moth 10 days later.

Allied Radio

833 WEST JACKSON BLVD., CHICAGO 7, ILL.

CATALOG
NO 115
1948

EVERYTHING IN RADIO AND ELECTRONICS

INDEX ON PAGE 152

Building the wealth of the NATION

In the past ten years 67 major dams have been built in the United States. These mighty structures have been decisive factors in supplying power for war production. They have added billions of dollars to the national wealth in other ways — through flood control, irrigation, water supply and navigation.

Those dams, and still others now in the building or planning stage, will provide more power, more jobs, more conveniences of life in the days ahead.

Every great dam requires the moving of immense yardage. As a single instance, the mammoth Fort Peck dam in Montana contains 109 million cubic yards of earth. Scores of "Caterpillar" Diesels were used on this project. In fact, "Caterpillar" has built the majority of all the tractors used on the major dams in America in the last 40 years.

The existing dams, important as they are, foreshadow still greater programs of dam construction in the post-war era. Hundreds are projected around the globe. The tough battle-tested "Caterpillar" Diesels that have contributed their dependable power to dam construction in the past will be better fitted than ever to build the huge new dams of the future.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

Caterpillar Diesel

REG. U.S. PAT. OFF.

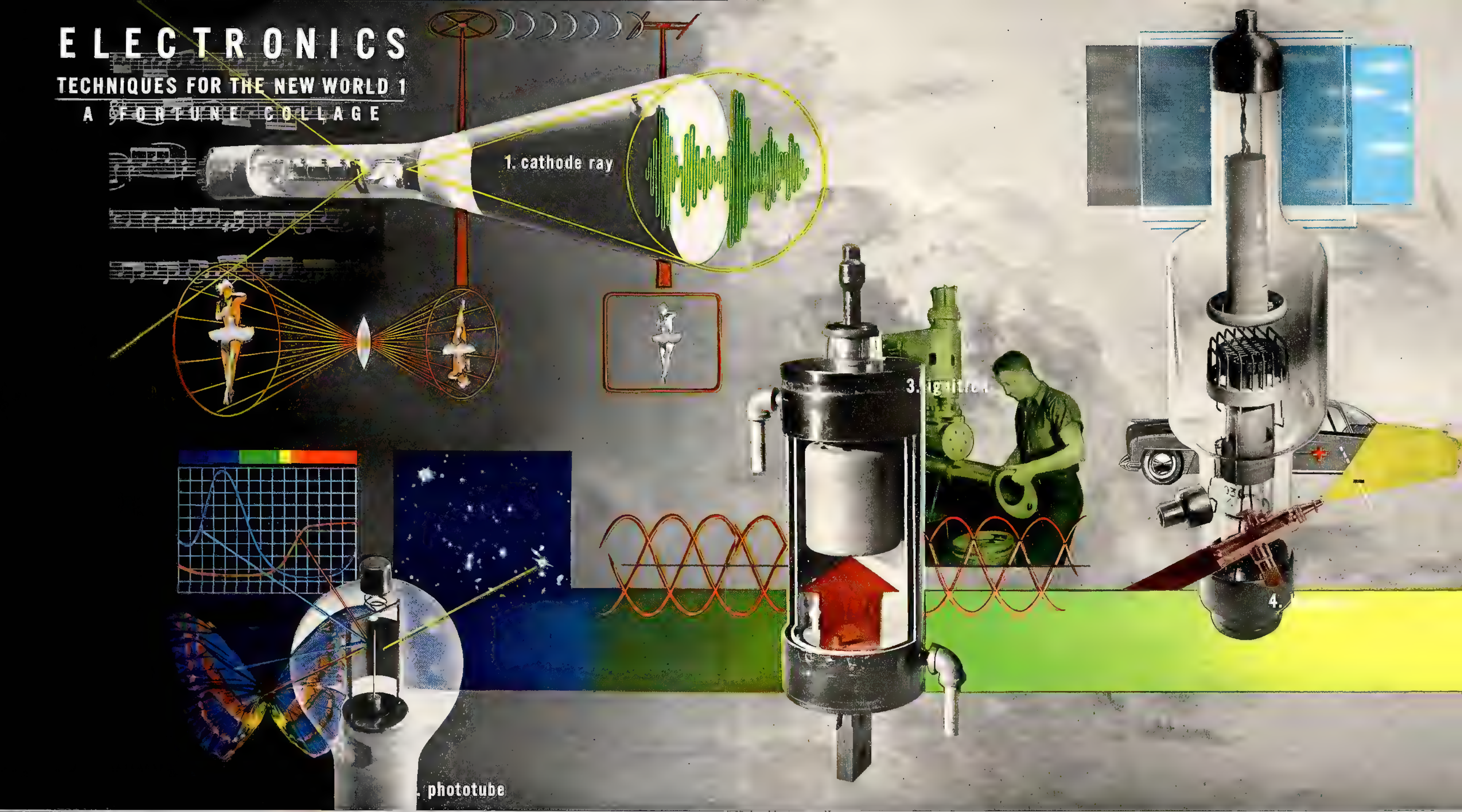
ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

The discharged veteran wears this emblem.
Remember his service and honor him.

ELECTRONICS

TECHNIQUES FOR THE NEW WORLD 1

A FORTUNE COLLAGE



1. The Cathode-Ray Tube is the television tube. A beam of electrons shooting from a gun in the tube's base scans the fluorescent screen on the far wall of the tube to paint the light and shadow images in the television receiver. In reverse, it performs as the iconoscope, or television camera. The electron microscope is also a super cathode ray. And cathode-ray oscilloscopes provide wave pictures of sound and current for study.

2. The Phototube, or "electric eye" emits its electron stream simply upon being struck by a ray of light. Its response to degrees of light runs its industrial uses into the thousands. In G.E.'s spectrophotometer phototubes distinguish two million shades of color to control color standards in paints, plastics, and dyes down to the tint of a butterfly's wing. Phototubes guide steel-plate flame cutters and count stars in observatories.

3. The Ignitron is a rugged, high-power rectifier—changing alternating into direct current—with a pool of mercury as cathode, and an ignitor stopping and starting the flow of electrons in a fraction of an alternating cycle. Great ignitron units speeded the aluminum-magnesium program, demanding vast amounts of D.C. power. And ignitrons are controls in the new resistance welding of aluminum shown above.

4. The Kenotron is the simplest of rectifier tubes, with no controlling grid or ignitor. It feeds direct current to X-ray tubes. It passes current to the alternate positive-negative plates of Westinghouse's Precipitron, the electrostatic device that draws all dust and smoke from air. And it charges G.E.'s atomized paint spray gun, in which the negatively charged paint globules all fly to the positively charged metal surface to be sprayed.

Color to catch the eye . . . *to close the sale!*

Shape your sales program to the pattern of molded color . . irresistibly attractive and sales-compelling!

Shape your production schedules to the advantages of molded color . . efficient, highly adaptable, unusually profitable!

Almost every industry can find advantageous uses for Molded Plaskon. If this richly-colored material cannot be adapted to a product itself, it may find use for the unique display or unusual packaging of that product.

Visualize the application of clean, clear, fadeless Plaskon colors to your product, its display needs, or its container. The examples of colored Plaskon-molded units shown here, ranging from purest white through dainty pastels and brilliant hues to jet black, are only a few of modern industry's uses for this practical plastic. These colors are available from a high degree of translucence to complete opacity.

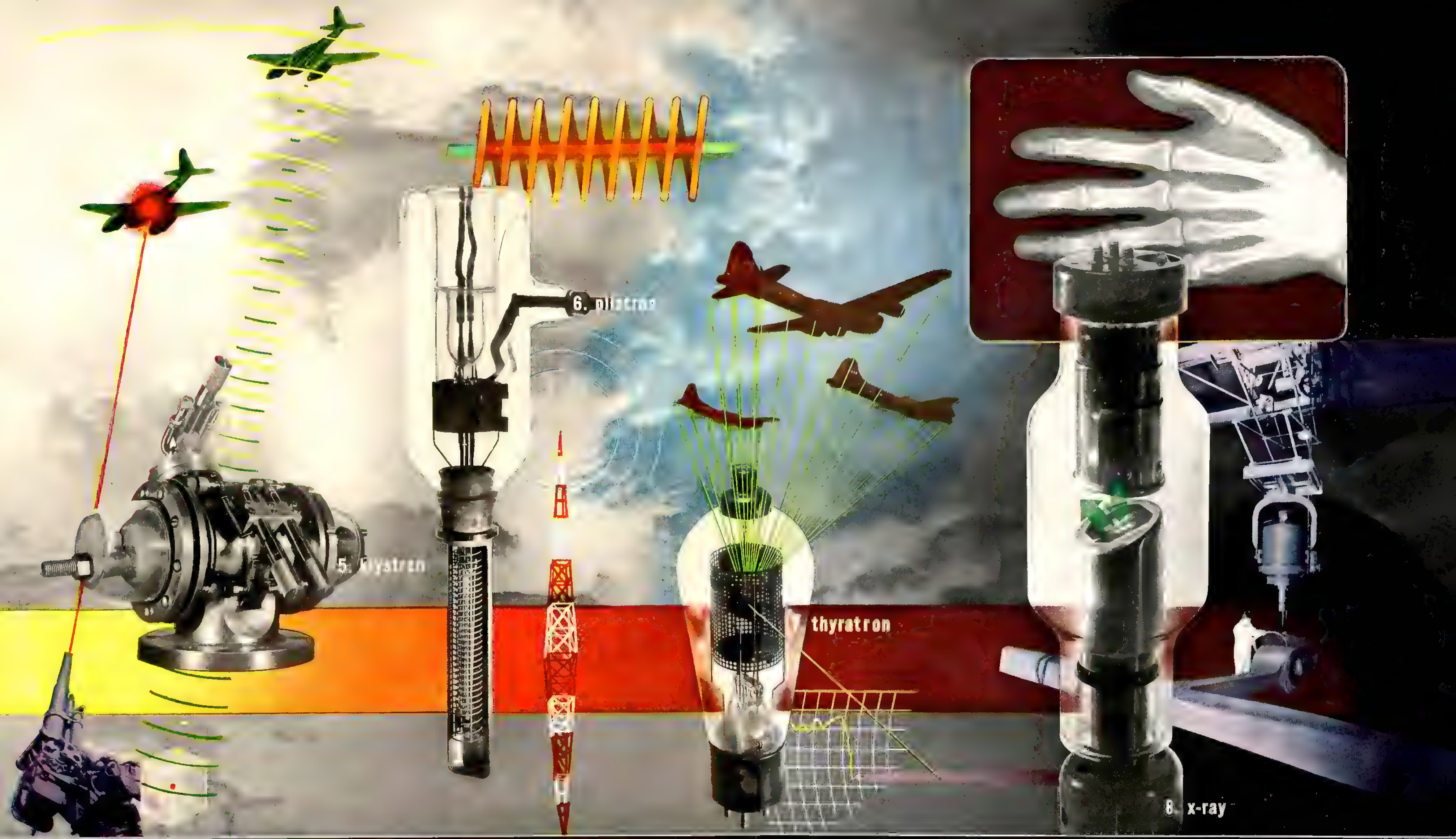
Molded Plaskon is smooth, warm and pleasing to the touch. Though light in weight, it has great strength. It will not chip, rust, corrode or tarnish. The finish is permanent. Scratching or abrasion do not lessen its color value. Plaskon is a sanitary material—tasteless, odorless, inert. The surface is hard, non-porous, easy to keep clean. Plaskon has exceptionally low heat transference—high dielectric strength.

In your program of product improvement, display, or packaging, consider versatile Plaskon . . . *the world's largest-selling urea-formaldehyde plastic.* Ask an experienced Plaskon representative to confer with you. Plaskon Company, Incorporated, 2125 Sylvan Ave., Toledo, Ohio.

PLASKON

TRADE MARK REGISTERED

MOLDED COLOR



5. The Klystron is one of a group of ultra-high-frequency generator tubes, including magnetrons, that are the heart of radar, the new military detection device. The klystron puts out extremely short, bunched waves with the beamlike characteristics and speed of light. The waves bounce back from aircraft or other objects within range (about 130 miles) as signals whose time-in-transit provides distance, location, other data.

6. The Pliotron is the radio generator-detector-amplifier tube, ranging from the five-foot, $1,500 transmitter tube in radio stations to the tiny tubes in your radio set. It is basic in the new FM radio system. And it is also the heart of diathermy and the new, swift, precise, high-frequency induction heating (heating simultaneously inside and out) of metals, plywood sheets, aircraft parts, a growing list of materials.

7. The Thyratron is a mercury-vapor rectifier tube for low power levels (contrasted with the ignitron for high) with great industrial versatility. Its biggest and newest fields are: welding controls; motor controls supplying D.C. variable speeds to machine tools; and thermostatic controls—taking and recording, for instance, 144 temperature and pressure readings in three minutes from 144 spots around a bomber in flight for air testing.

8. The X-Ray Tube hurls a stream of electrons at terrific velocity against a target, producing rays that penetrate solid substances and expose a shadowgraph picture on photographic film. Aside from its wide medical uses in diagnosis and cancer treatment, the biggest thing in X-rays is G.E.'s compact, bomblike one-million-volt industrial X-ray that is peering to a depth of eight inches through huge steel castings, detecting flaws.

broadcasting, because it had no manufacturing subsidiary that could profit from the sale of sets; because it wanted to use the delay to strengthen its position; because it wanted to pose as a champion of science before the public. Last May, the FCC stepped in and settled the issue—for the time being. It instructed television broadcasters to proceed with service at present frequencies. Then—on the grounds that the lower frequencies did not provide enough channels for "a truly nationwide and competitive television system"—it assigned to experimental television the frequencies between 480 and 920 megacycles "which will permit the development of color television and superior black and white television through the use of wider channels."

More than ever determined to make good its position, C.B.S. stepped up the tempo of its research. Its engineers, headed by Dr. Peter Goldmark, took a low-frequency color system put on the air by C.B.S. before the war but set aside for lack of space in commercial television channels, and redesigned it for UHF operation. This system achieved color by means of a mechanical filter—made up of red, green, and blue segments—that rotated twenty times a second. Placed in the pickup camera at the transmitting end, the drum filtered red, green, and blue light waves from the subject being televised and with them modulated outgoing signals. These signals, at the receiver, passed through another color filter (exactly synchronized with the first), which translated them back into red, green and blue light.

This system was not new. But it worked. Last October, exactly a year and a month after the company had been assigned its experimental UHF channel, C.B.S. announced that it had broadcast color television at 485 megacycles from a twenty-five-watt transmitter atop the Chrysler Building and had received the pictures "with superb clarity" across town. It also announced

[*Continued on page 246*]

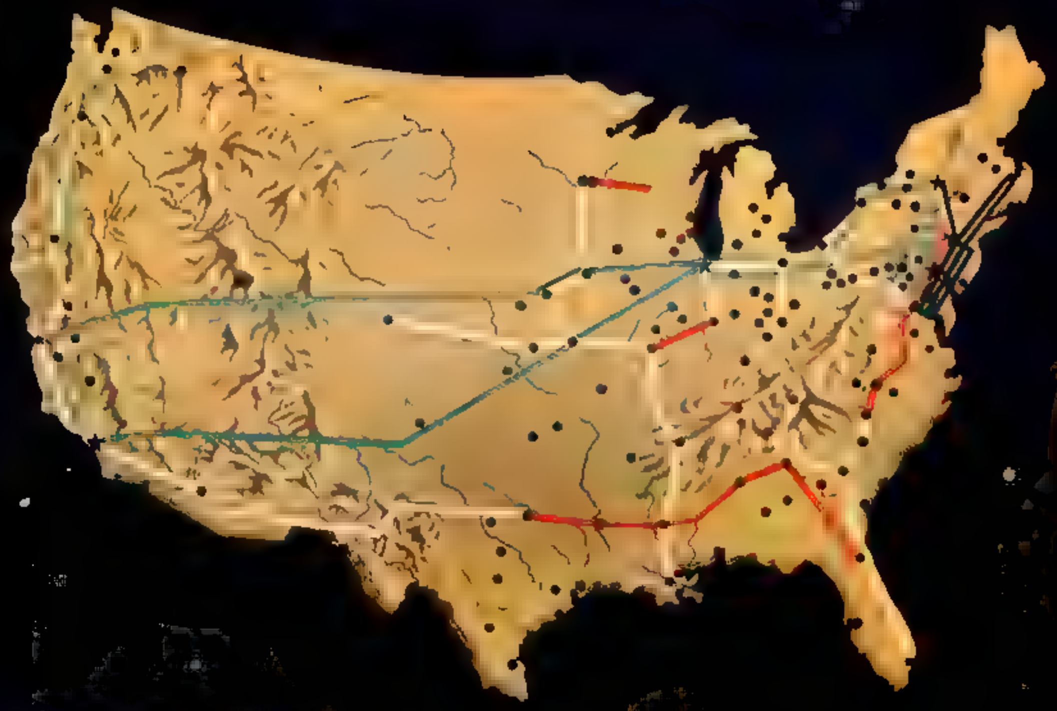
THE MAP ON THE OPPOSITE PAGE shows the plan of television's growth. Though there are only six commercial stations in the U.S. at present, FCC has allocated frequencies for 400 commercial broadcasting stations in the top 140 marketing areas of the country (see list on page 259), and the television industry is pondering the best way to hook them up by cross-country relay. Three types of relay have been proposed. One is the coaxial-cable system. So far, about 1,500 miles of cable have been installed and another 5,000 miles are scheduled to pipe telephone and television signals across the U.S. Estimated cost: $100 million. Though present cable links provide television channels only 2.7 megacycles wide, A.T.&T. has announced that it can widen these channels to carry the four megacycles needed for black and white and the [illegible] needed for color.

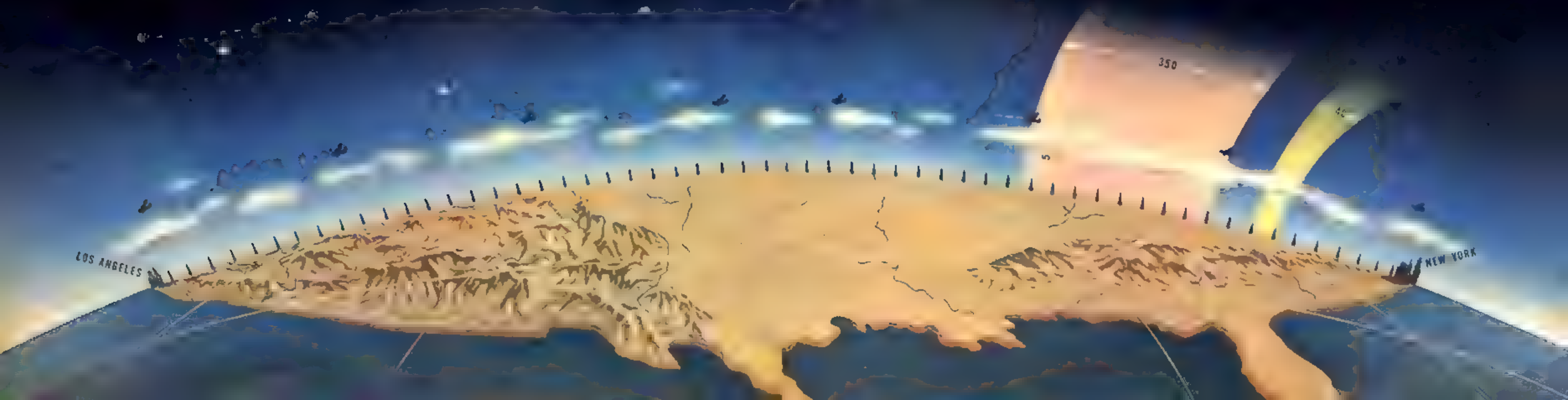
RADIO RELAY is the second way to carry television across country. This system is based on the fact that television signals can be directionally beamed as far as the horizon, and with only tiny amounts of power, if they are transmitted at extreme high frequencies. Thus sixty-odd relay towers, spaced approximately forty miles apart and equipped to receive signals, amplify them, and retransmit them, could span the U.S. (see below). Already, Philco and G.E., in conjunction with International Business Machines Corp., have constructed experimental radio relays along the eastern seaboard, while Raytheon and Globe Wireless are laying plans to string a series of relay towers across the country (see map at right). The cost of a cross-country hookup, which has been estimated at over $5 million, could be met not only by television revenues but also by revenues from FM, facsimile, Radiotype, and other short-wave services.

Stratovision is the third—and most dramatic—proposal for a television network. Sponsored by Westinghouse, Stratovision provides that television signals be radio-relayed between planes in the air. A plane, carrying the proper transmitting equipment and flying above a fixed point at an altitude of 25,000 feet, could receive a directionally beamed signal from a sister plane 350 miles away, amplify it, and retransmit it another 350 miles. This might mean that only eight planes, costing an estimated $175,000 apiece, could relay television signals all the way from New York to Los Angeles.

KEY TO RELAY MAP

🟥	Coaxial cable installed or under construction.
🟨	Proposed coaxial-cable routes.
🟩	Radio relays installed or under construction.
▭	Proposed radio relay routes.





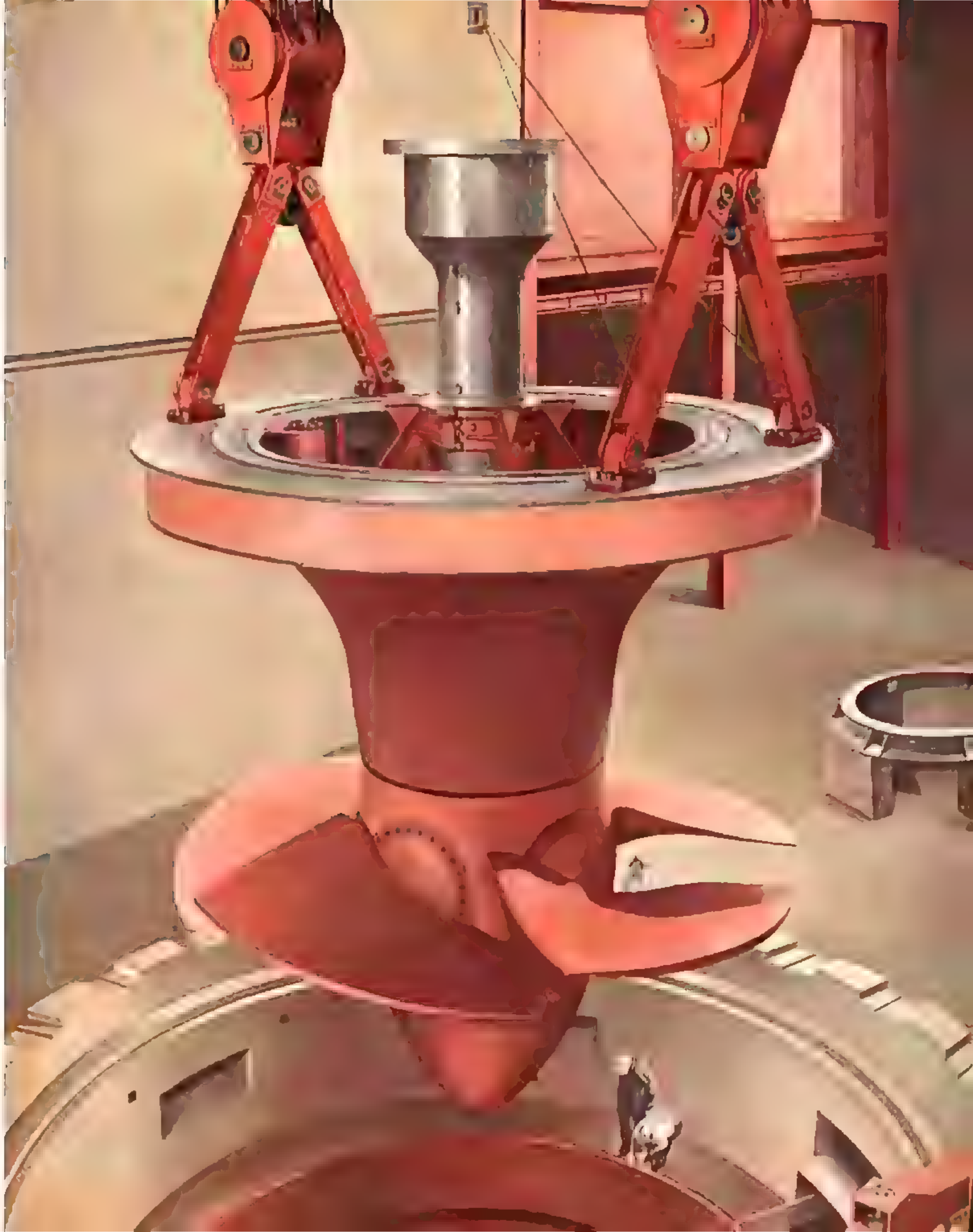
Goodyear Synthetics STAND UP "BEYOND ALL EXPECTATIONS" *

Says a rural telephone lineman

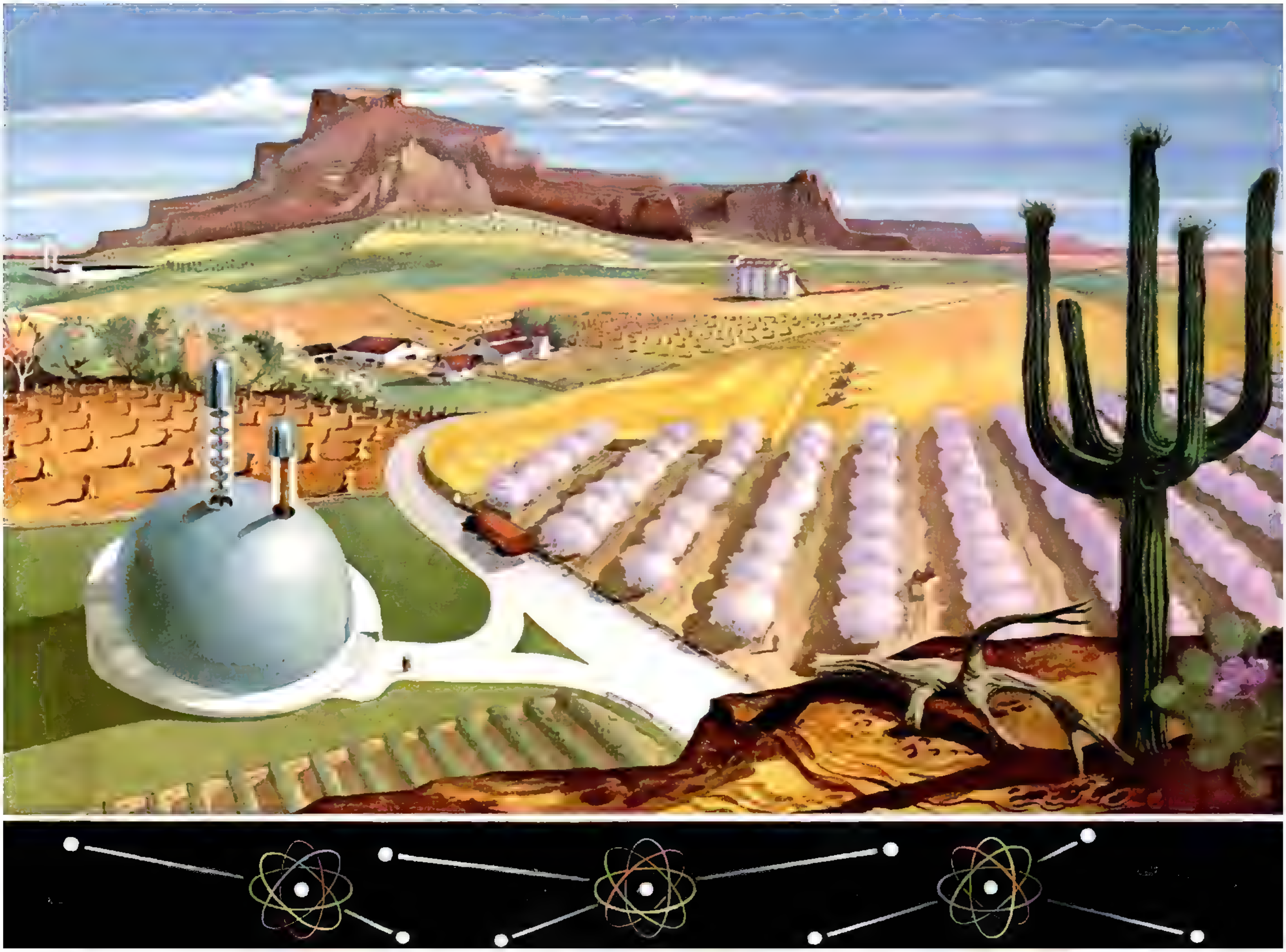
Refraction

is the scientific measuring of your ability to see
— one of the necessary steps toward eye comfort

Here, in a room larger and more still than a corridor in the Vatican, the runner of a hydroelectric turbine floats majestically down into its pit. When the huge red ring settles in its bed and the generator is connected to the bright steel shaft, water will shoulder through the penstocks under the dam, pass the opened gates, swirl around this tapered casing, shove against the sloping planes of the propeller blades, and churn through the tailrace below them. This is Unit No. 2 at Guntersville on the Tennessee River, a part of TVA. Its propeller is 265 inches in diameter, smaller by only a few inches than the world's highest-powered Kaplan unit at Bonneville. For decades it will whirl out power with few stops, no fuel, and very little supervision. The important man-hours of labor will all have gone before: the hours put in by the machinists who built the power shovels that prepared the damsite; the dusty, slamming hours of the drivers who worked them; the hours of the workers in cement plants, sweating in gritty overalls; the hours in that hall of the mastodons, the shop of the S. Morgan Smith Co. at York, Pennsylvania, where the great bones of this turbine were shaped and fitted together. All of these man-hours are implicit in this moment of achievement, will henceforth be transmuted and run off into millions of kilowatt-hours to provide comfort to many men and women and aid to them in further efforts. This, then, is the symbol of a colossal sharing, a bringing together and a giving out of energies. But because the mechanism of the sharing itself is money, and because large-scale hydro requires so much money—about twice as much as steam per kilowatt of capacity—and because expensive dams can often be used to aid flood control and navigation also, it is perhaps natural that such projects should be increasingly undertaken by the government.



BY MEN WHO PLAN BEYOND TOMORROW



Deserts Will Bloom Through Atomic Power

NEW "BREAD BASKETS" of the world can grow where only sand and scrub had been. Harnessed atomic energy will transform deserts into rich fruit and grain country...provide power to tap subterranean water for irrigation, power to run machines, to operate utilities. Already Atomic scientists are adapting the world's newest wonder to this peacetime use.

* * *

AMONG the good things of life, Americans by the millions rate high the wholly unique Canadian whisky they order by name—Seagram's V.O. This *lightest* of all Canadian whiskies, this *clean-tasting* imported blend is Canadian whisky at its glorious best.

This Whisky Is Six Years Old—86.8 Proof. Seagram-Distillers Corporation, N. Y.

Seagram's V.O. Canadian

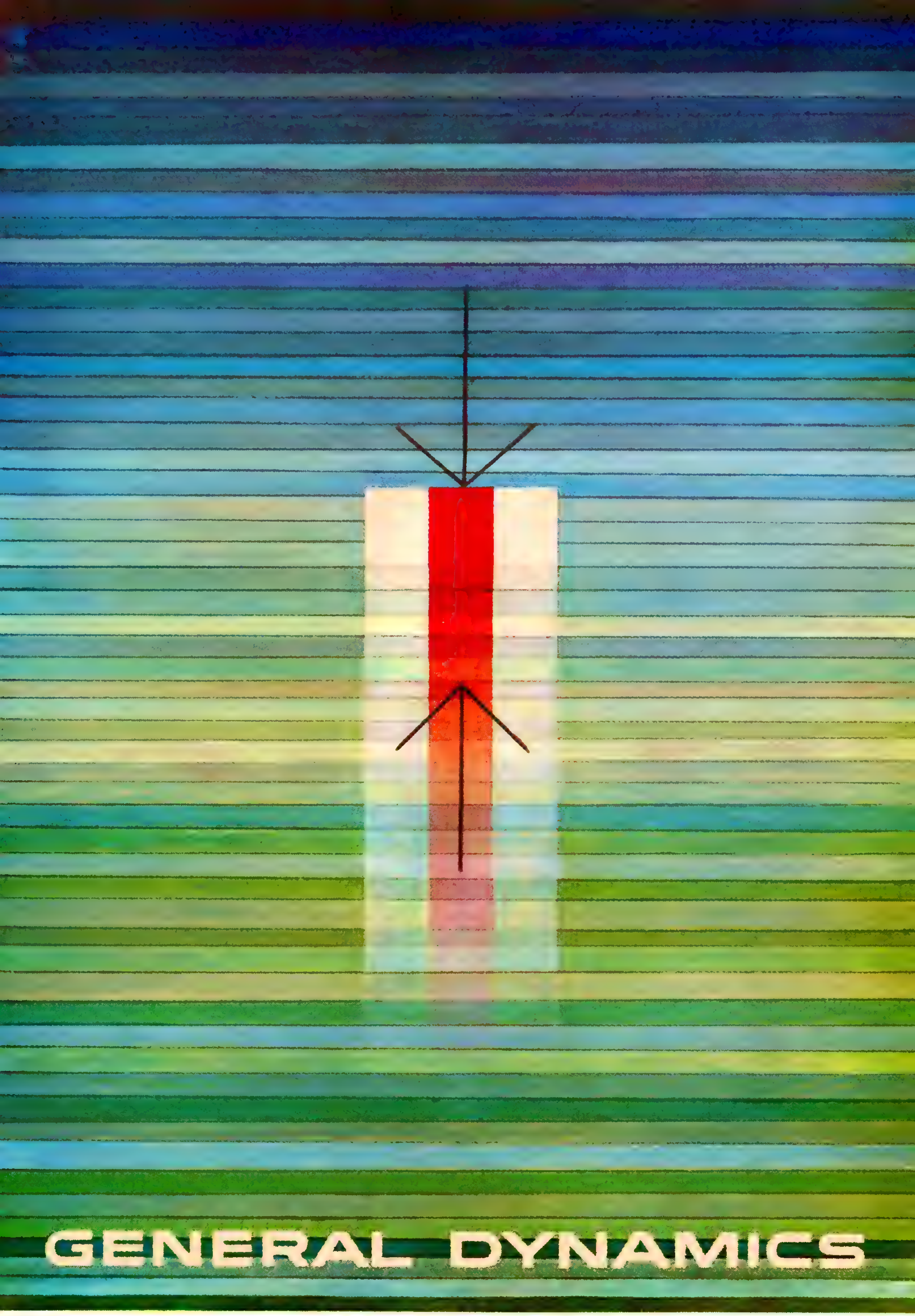
CANADIAN WHISKY—A BLEND...OF RARE SELECTED WHISKIES

XR

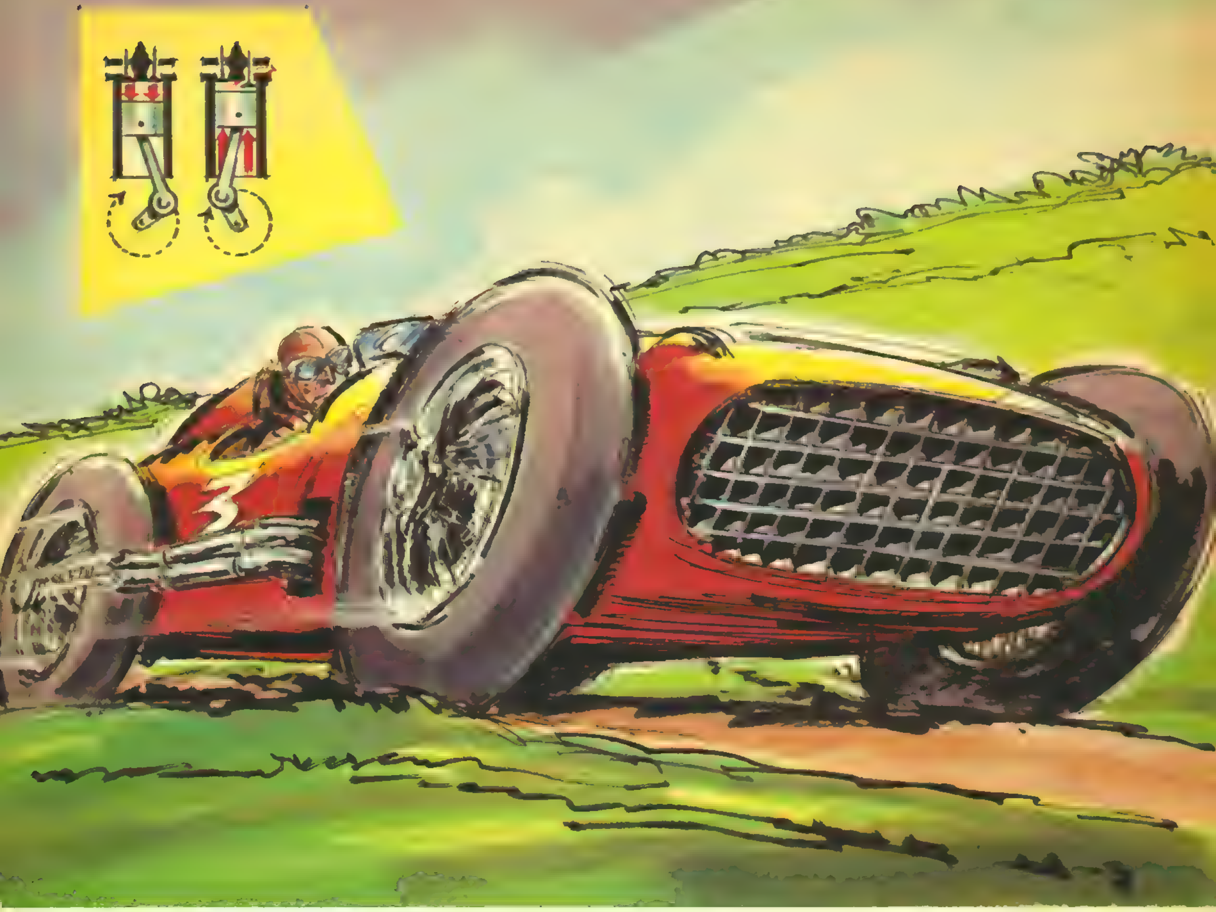
GENERAL DYNAMICS

PM XR

GENERAL DYNAMICS CORPORATION • 445 PARK AVENUE, NEW YORK 22, N. Y.



GENERAL DYNAMICS CORPORATION • 445 PARK AVENUE, NEW YORK 22, N. Y.



Later on, the invention of the gasoline engine, or internal combustion machine, greatly increased our transportation possibilities, making travel easier and faster. The use of atomic power will further these possibilities.

his car and let you look inside. The gasoline engine of an automobile works on the principle of internal combustion—that is, explosions take place inside cylinders in the engine block. Each explosion is caused when gasoline vapor mixed with air is ignited by a spark from the spark plug.

The explosion forces the piston inside the cylinder to go down and turn the crankshaft.

We hope that now you are beginning to understand what an internal combustion engine is.

We also hope that you are beginning to understand what is meant when people say that the world has become smaller. Today we can get from one place to another much faster and with much less trouble than people were ever able to do in the past.

Imagine how much easier it will be to travel when atomic power is used in planes, trains, and even automobiles.

GENERAL ELECTRIC
TRI CLAD INDUCTION MOTOR
TRI 55 CLAD
THE LEADER IN MODERN MOTOR DESIGN
Progress is our most important product
GENERAL ELECTRIC

POPULAR SCIENCE

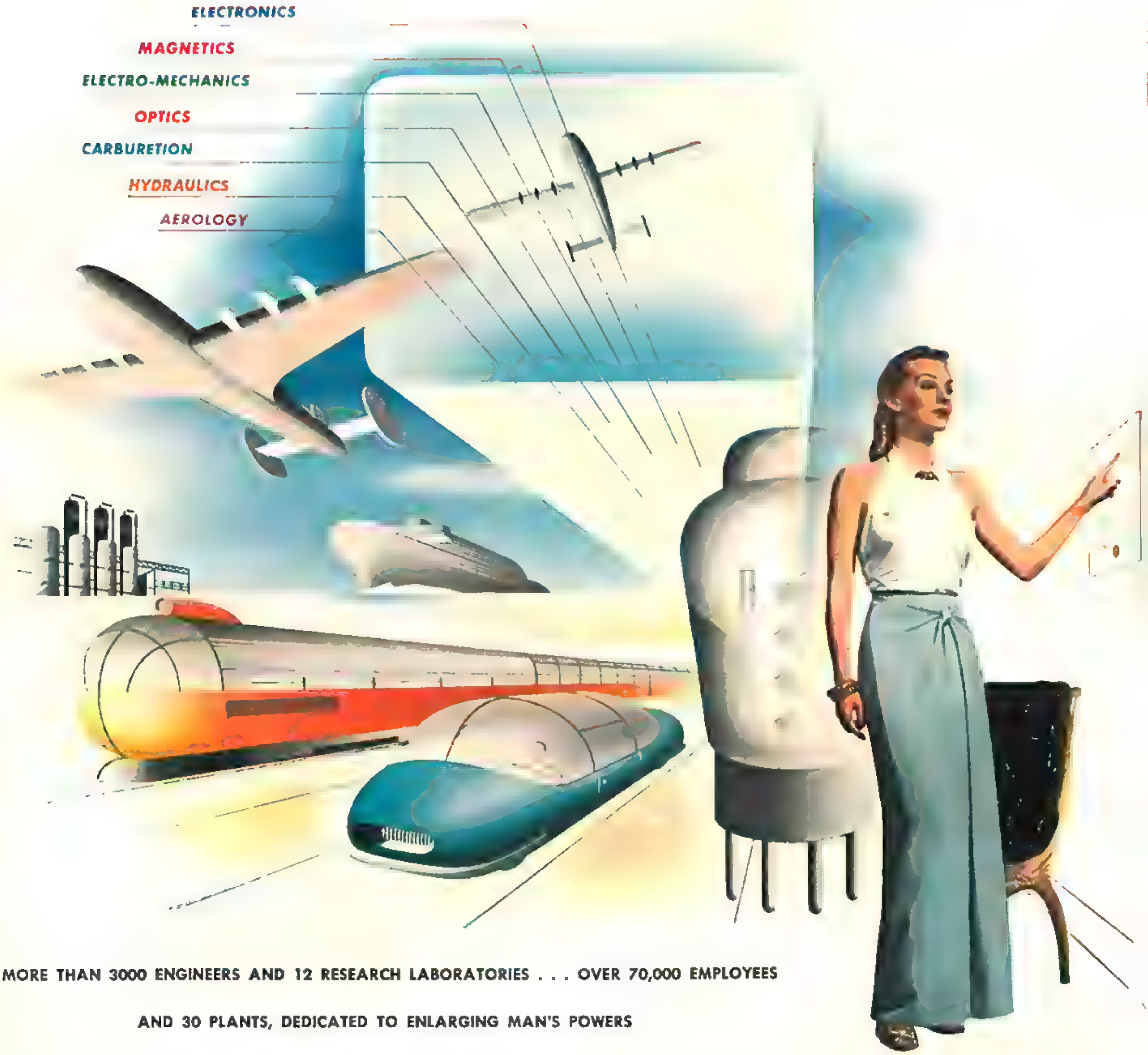
Feb. 1950 25¢ Monthly

Sky Cow for Jets — page 11

Big Mouth Eats a Ton a Second

PAGE 100

THIS IS BENDIX



MORE THAN 3000 ENGINEERS AND 12 RESEARCH LABORATORIES . . . OVER 70,000 EMPLOYEES AND 30 PLANTS, DEDICATED TO ENLARGING MAN'S POWERS

We have tried above with figures, pictures, and words to give you the story of Bendix. We have tried, because Bendix—and the *Creative Engineering* for which it stands—is tremendously important to you and yours.

Important *now*, because Bendix developments are helping in a thousand ways to enhance the powers of our fighting men—making safer and easier the flight, navigation and piloting of transport and battle planes . . . assuring better starting, stopping, steering and operating of trucks, tanks and jeeps . . . supplying the instruments and controls that carry commands, measure speed, give alarms, locate targets, and aim and fire guns on naval and merchant ships.

And important *tomorrow*, because the scientific brains and muscles created for victory can improve the future world its industrial processes, communications, transportation, home life.

But figures, pictures, and words can scarcely portray Bendix. For Bendix, as much as anything, is a state of mind. Imagination undaunted by difficulties. Aspirations that ignore the impossible. The will to build a better and brighter tomorrow—*and the scientific skill and knowledge to do it.* Unleashed on the problems of peace—but these must wait. How long? Well, your War Bond purchases can speed the day. Buy to the limit and beyond.

BENDIX AVIATION CORPORATION, DETROIT, MICH.

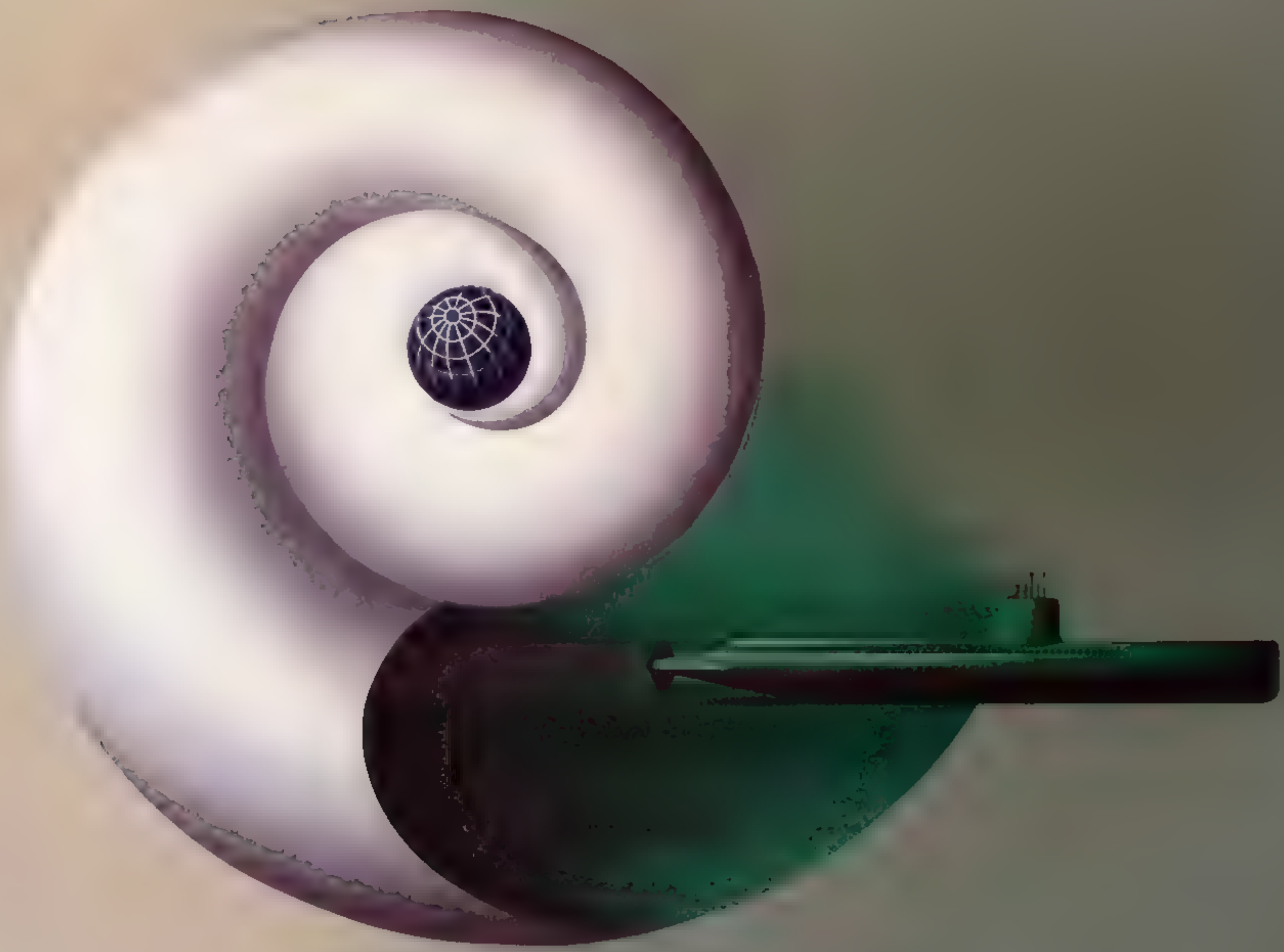
BENDIX • ECLIPSE • PIONEER • FRIEZ
SCINTILLA • STROMBERG • ZENITH • ALTAIR

—*Trade-marks of Bendix Aviation Corporation*

***First* IN CREATIVE ENGINEERING**

BUILDERS OF THE INVISIBLE CREW

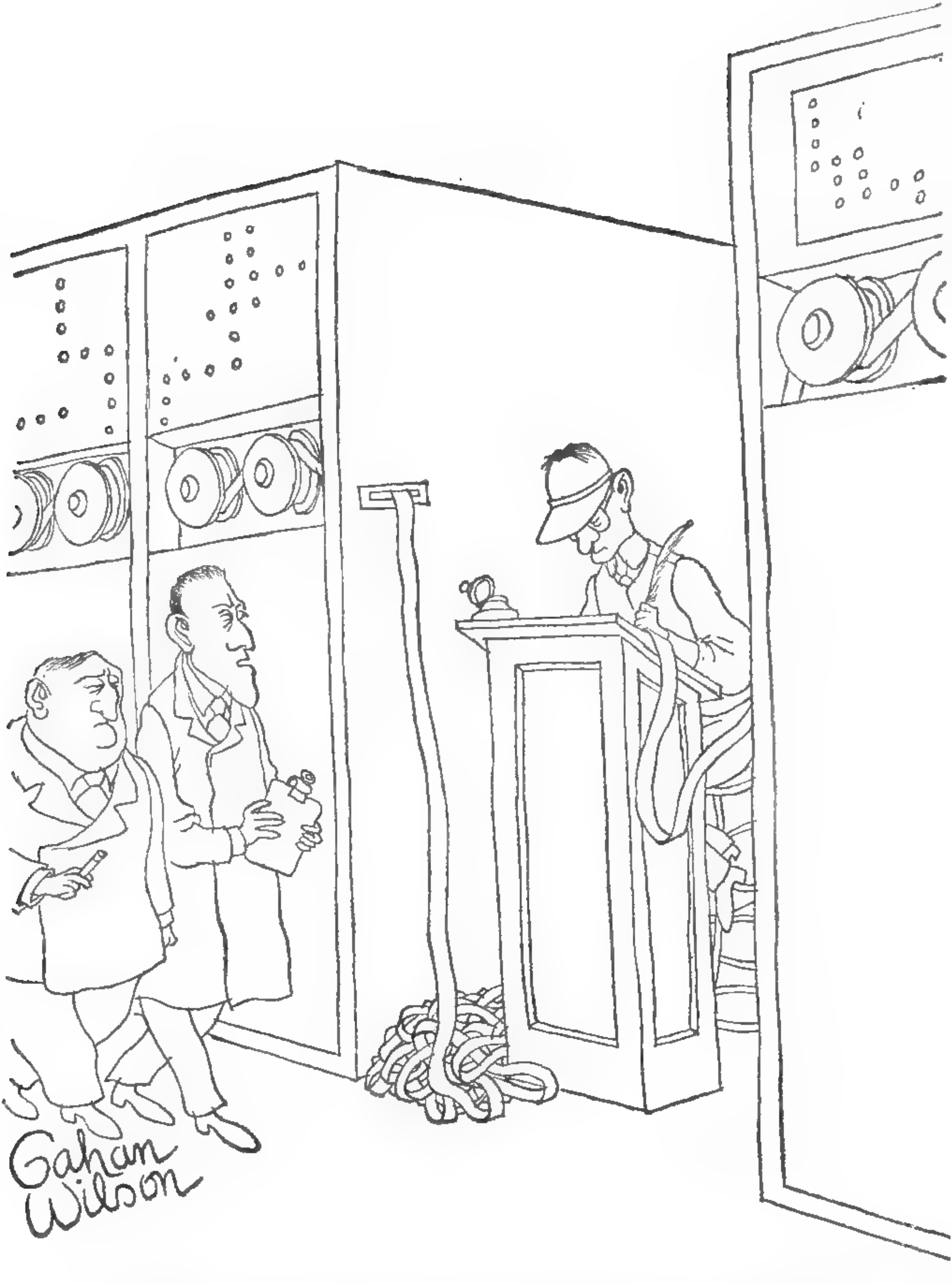
l'atome au service de la paix



hydrodynamics

GENERAL DYNAMICS

XR



"I think you'll agree with me, Chief, that this time we've really put our finger on the bottleneck."

XR

BOHN

New industrial products of virtually every description will need an ever-increasing quantity of aluminum and magnesium products. Consult Bohn first.

BOHN ALUMINUM & BRASS CORPORATION
GENERAL OFFICES—LAFAYETTE BUILDING • DETROIT 26, MICH.

Designers and Fabricators—ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT TYPE BEARINGS

A Future Cotton Picker

SALE
XR

T
N
R
OHIO
LOCKLAND
COMMITTEE
ROOM
A
U
XR
ALEXANDER

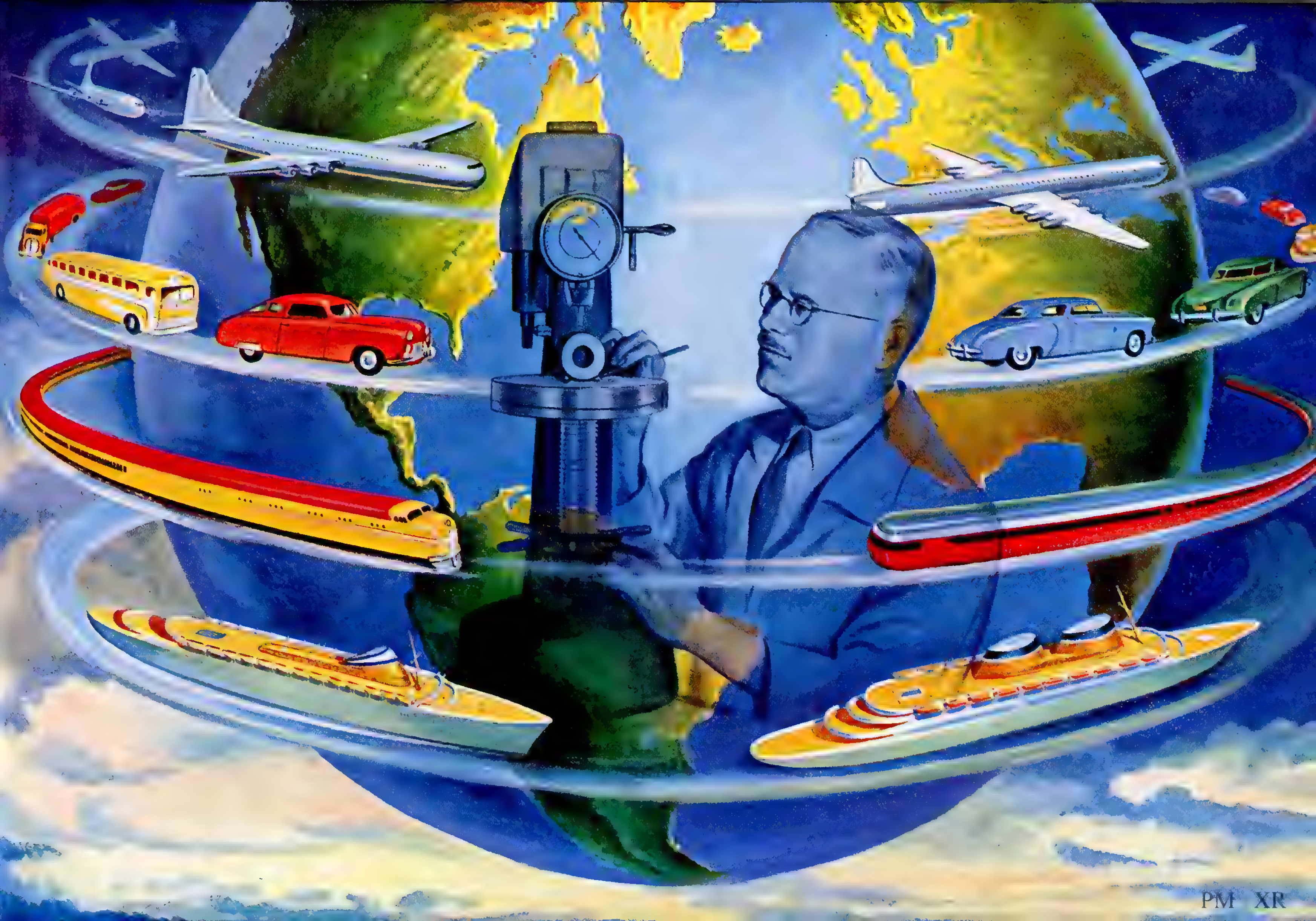
Artist – Charles Howard

CALIFORNIA—*annual purchases: $8¾ billion—mostly packaged.*

CONTAINER CORPORATION OF AMERICA

Save Waste Paper

XR


PM XR

You couldn't stay in business without your printer

Let him be your partner in designing printing that gets things done

PM XD

It Takes 500 Tons of Equipment for Just One Telephone Exchange

Five hundred tons of equipment and 62,000 man-hours of work are needed to install just one 10,000-line Dial Telephone Exchange.

Here's the story of months of work condensed into two minutes of reading time. (Bear with us, please, if several of the words get technical.)

There are 1800 crossbar switches, 4000 multi-contact relays and 65,000 conventional relays. These automatic switching mechanisms open or close millions of telephone circuit paths.

Eighty miles of cable are needed to connect all this apparatus. There are 2,600,000 soldered connections, each one a careful hand operation.

All that is for only one Telephone Exchange to serve one community. At present-day prices, the cost runs to $1,500,000.

The money for these new facilities must come largely from investors who are willing to put their savings in the business.

Only through reasonable earnings can the telephone company attract the new money that is needed to do the job.

BELL TELEPHONE SYSTEM

XR

HOW *Radio-Relay* WORKS

The microwaves used for telephone transmission travel in a straight line. So relay towers, like those shown, are usually built on hilltops, averaging about 30 miles apart. Each tower picks up microwaves from its neighbor, and with complex electronic equipment amplifies and focuses them like a searchlight, then beams them accurately at the next tower. And hundreds of Long Distance telephone calls ride the beam at the same time.

New skyway spans nation with words and pictures

BELL SYSTEM *Radio-Relay* BUILT FOR LONG DISTANCE CALLS AND TELEVISION

There's something new on the national horizon! Bell Telephone construction crews have completed the last link in a coast-to-coast *Radio-Relay* system that is unique in all the world. Today, communications ride on radio microwaves, flashed through the air from tower to tower.

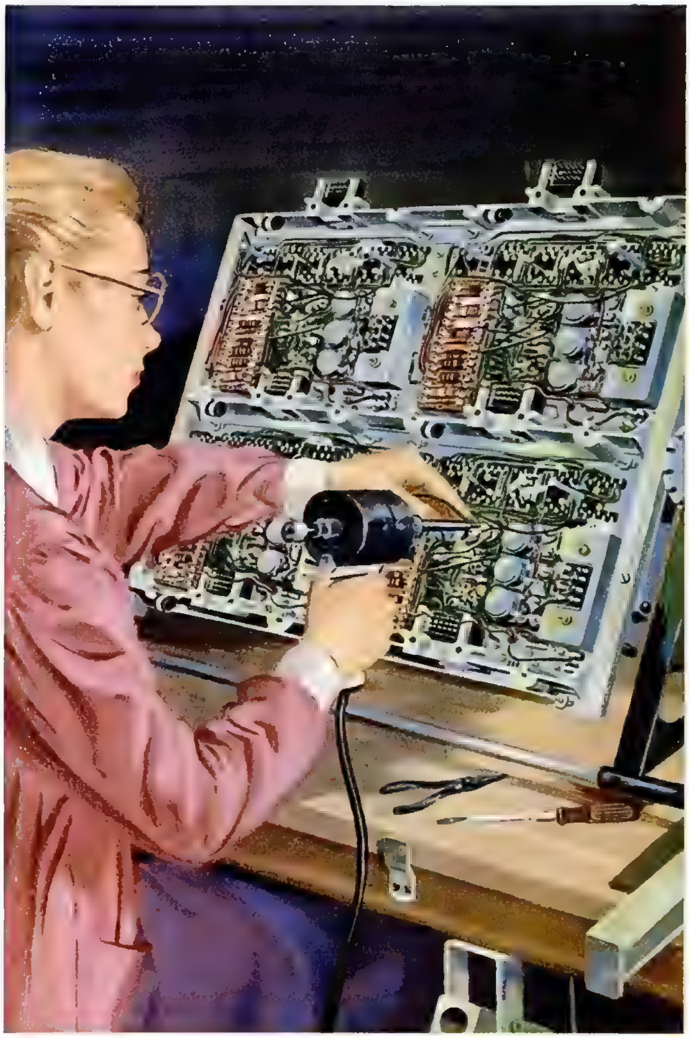
It was an historic event in 1915, when wires first carried the human voice across three thousand miles of mountains and prairie. By 1942, telephone messages were carried across the United States by another means—cable, both underground and overhead. And now comes *Radio-Relay* to supplement wire and cable!

The new system is already in use for Long Distance telephone service and coast-to-coast television. This new skyway helps make America's vast communications network even stronger and more flexible. And it could hardly happen at a better time. The demands of defense are heavy and urgent.

BELL TELEPHONE SYSTEM

XR

Look-alikes?



...yes, but one directs guns, the other directs telephone calls

Each of these units of electronic equipment is important to national defense in its own way. Together they symbolize the double-barrelled defense job being done by Western Electric — the manufacturing unit of the Bell Telephone System for the past seventy years.

With the help of thousands of sub-contractors, large and small, we're turning out special military communications and electronic equipment for the Armed Forces. For example: a radar fire control system for anti-aircraft guns, a part of which is seen in the left-hand picture.

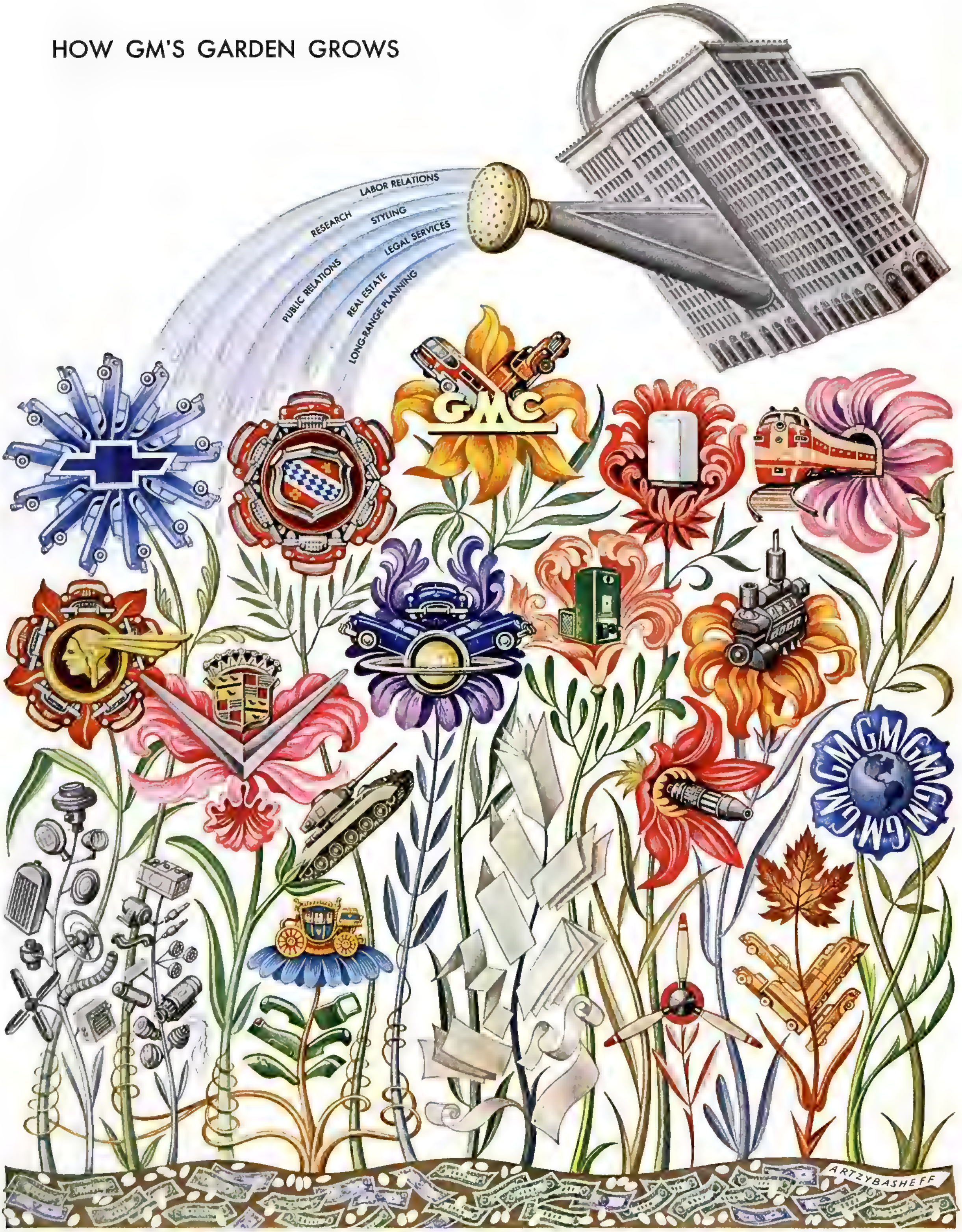
Naturally, we're also busy on our regular job of making telephone equipment — such as the dial switching unit at the right — to help keep the Bell telephone network going and growing in the nation's service.

Western Electric

BELL SYSTEM

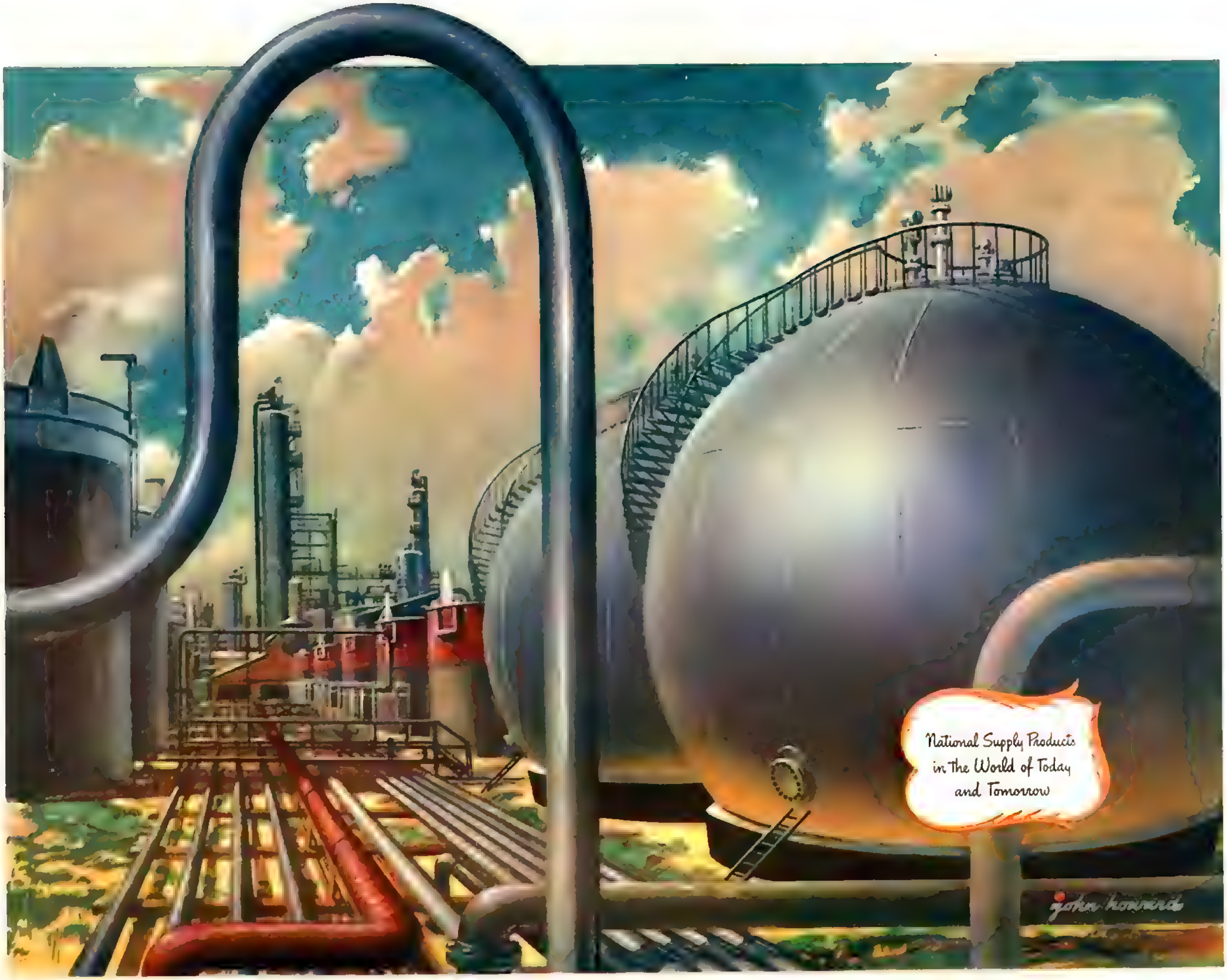
MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM

HOW GM'S GARDEN GROWS



THE GM SYSTEM OF FLORICULTURE provides the corporation's 39 divisions with a rich soil of consumer dollars in which to grow, and rich nourishment in the form of legal, financial, research and engineering advice, and distribution and styling help. "Central office," here represented by a wing of the Detroit GM Building, also sets major policies and corporation labor and public relations patterns. Otherwise each division operates with all the competitive aggressiveness of an independent company. This combination of paternalism and individualism has produced opulent blooms like (*top row*) Chevrolet, Buick, GMC Truck and Coach, Frigidaire, Electro-Motive; (*second row*) Pontiac, Cadillac (soon to make tanks), Oldsmobile, Delco Appliance, the diesel divisions, Allison (aircraft engines), the Overseas Operations. Aiding these are (*bottom row*) the vital accessory and Fisher Body divisions, insurance, retail and dealer financing divisions, Aeroproducts, four Canadian divisions.

XR



It takes a lot of pipe to handle petroleum

Catalytic cracking of gasoline has met America's great requirements in high octane gasoline, synthetic rubber, and chemicals.

Many millions of feet of pipe, tubing and conduit, such as made by Spang-Chalfant Division of The National Supply Company, have been used for the rapidly growing operations of catalytic cracking, alkylation and isomerization. And many more millions of feet will be used for refineries now projected to meet world needs for petroleum products.

NATIONAL-made Spang Pipe has a reputation for more than 100 years of excellent service. It is used in large quantities for drilling, pumping and refining of world petroleum. It is interlaced in the essential structure of factories, offices, public buildings, institutions . . . residences, trains, ships . . . wherever liquids, gases and electrical energy are produced, transported and consumed.

NATIONAL Oil Field Machinery and Equipment are old-time favorites with oil men all over the world. They use more products made by The National Supply Company than that offered under any single other brand name. Superior Gas, Oil and Diesel Engines also are made by The National Supply Company. Thousands of these engines, ranging from 10 H.P. to 1325 H.P., are serving the industrial, marine, agricultural and municipal power needs of America and the world.

All of these NATIONAL products have done exceptional wartime duty at home and abroad. Each has a definite place in the rehabilitation, conversion and new planning needs which all commerce and industry face.

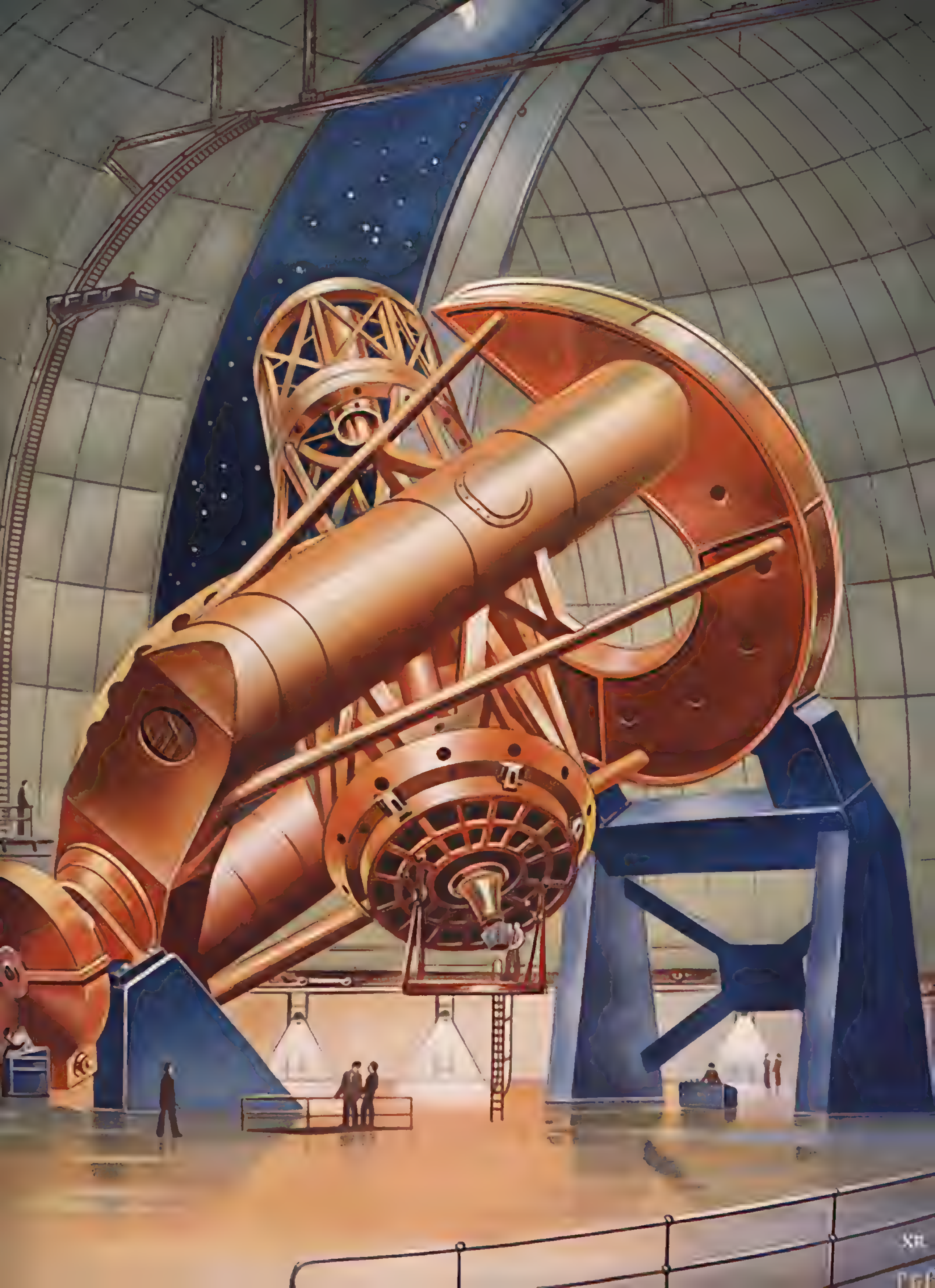
THE NATIONAL SUPPLY COMPANY

Executive Offices: Pittsburgh, Pa.

Plants: At Toledo; Torrance, Calif.; Houston; Carnegie, Pa., producing Oil Field Machinery and Equipment. At Ambridge, Pa.; and Etna, Pa., producing Spang Seamless Pipe, Spang CW Pipe, Spang Welded Pipe and Central Rigid Steel Conduit. At Springfield, Ohio, producing Superior Gas, Oil and Diesel Engines. Export Sales: The National Supply Corporation, 30 Rockefeller Plaza, New York, N. Y.

XR

Electricity works for peanuts!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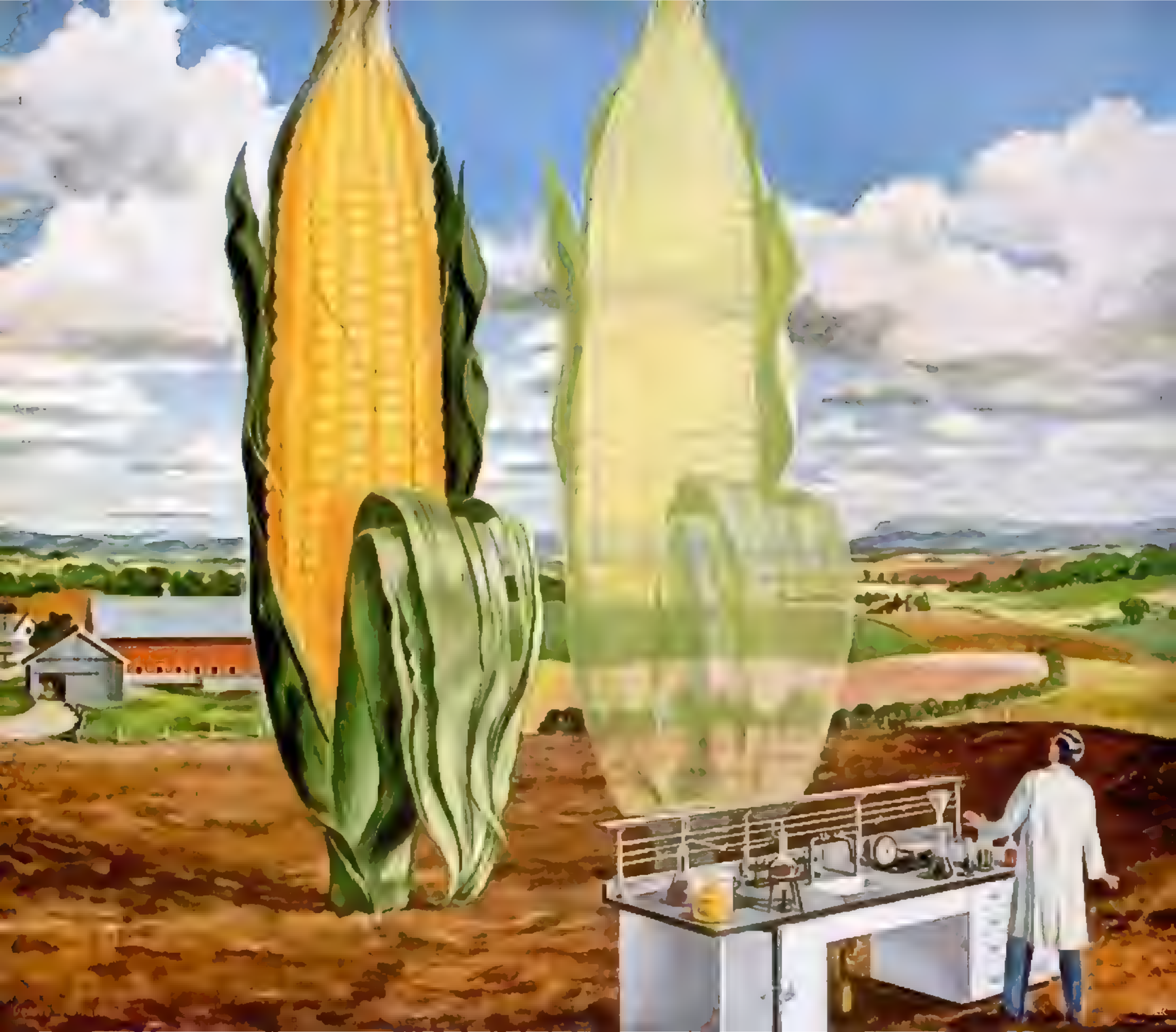

Fortune

One Dollar a Copy MAY 1940 Ten Dollars a Year

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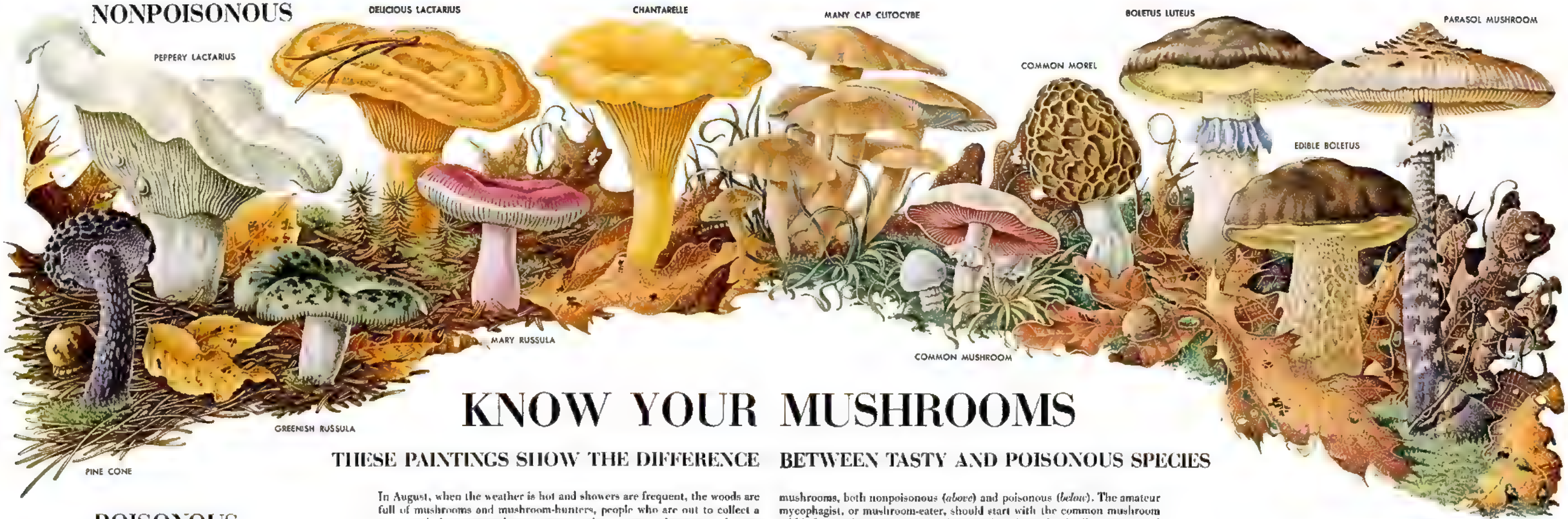
NONPOISONOUS

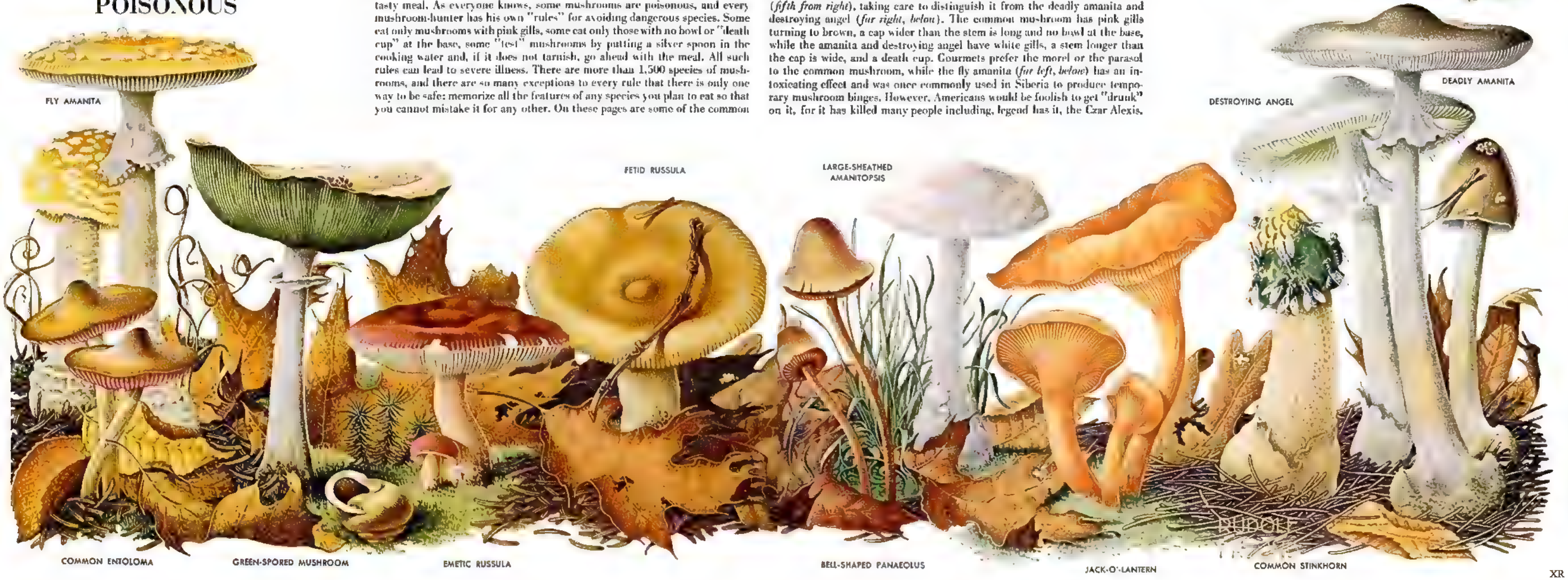


KNOW YOUR MUSHROOMS

THESE PAINTINGS SHOW THE DIFFERENCE BETWEEN TASTY AND POISONOUS SPECIES

In August, when the weather is hot and showers are frequent, the woods are full of mushrooms and mushroom-hunters, people who are out to collect a tasty meal. As everyone knows, some mushrooms are poisonous, and every mushroom-hunter has his own "rules" for avoiding dangerous species. Some eat only mushrooms with pink gills, some eat only those with no bowl or "death cup" at the base, some "test" mushrooms by putting a silver spoon in the cooking water and, if it does not tarnish, go ahead with the meal. All such rules can lead to severe illness. There are more than 1,500 species of mushrooms, and there are so many exceptions to every rule that there is only one way to be safe: memorize all the features of any species you plan to eat so that you cannot mistake it for any other. On these pages are some of the common mushrooms, both nonpoisonous (*above*) and poisonous (*below*). The amateur mycophagist, or mushroom-eater, should start with the common mushroom (*fifth from right*), taking care to distinguish it from the deadly amanita and destroying angel (*far right, below*). The common mushroom has pink gills turning to brown, a cap wider than the stem is long and no bowl at the base, while the amanita and destroying angel have white gills, a stem longer than the cap is wide, and a death cup. Gourmets prefer the morel or the parasol to the common mushroom, while the fly amanita (*far left, below*) has an intoxicating effect and was once commonly used in Siberia to produce temporary mushroom binges. However, Americans would be foolish to get "drunk" on it, for it has killed many people including, legend has it, the Czar Alexis.

POISONOUS



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COPYWRITTEN MATERIAL

The man with 10 thumbs

"That's the third job I've botched today!"

"It's not you, Smitty," the foreman said. "It's this terribly damp, hot weather. It raises cain with everybody. Even the machines and gauges are off. And production is down all along the line."

There isn't any reason why Smitty needs to have ten thumbs. Where heat and humidity are a problem, the answer is Carrier Air Conditioning.

By controlling climate, it helps to keep gauges accurate and machines in adjustment. Materials are easier to handle. Men can do a better job no matter how stifling the weather outside.

Right now, America's factories are shouldering vital defense burdens. Carrier is helping hundreds of them meet schedules.

Carrier Air Conditioning and Refrigeration are essential in the production of synthetic rubber, high octane gasoline, precision parts, pharmaceuticals, electronic equipment, textiles and hundreds of other products.

Whether it is production efficiency in a plant or human efficiency in an office, Carrier equipment can meet your requirements. Call the Carrier office listed in your Classified Telephone Directory. Or write Carrier Corporation, Syracuse, New York.

Carrier

AIR CONDITIONING
REFRIGERATION

DO YOU KNOW why Carrier Air Conditioning is so necessary to industrial production in these famous factories?

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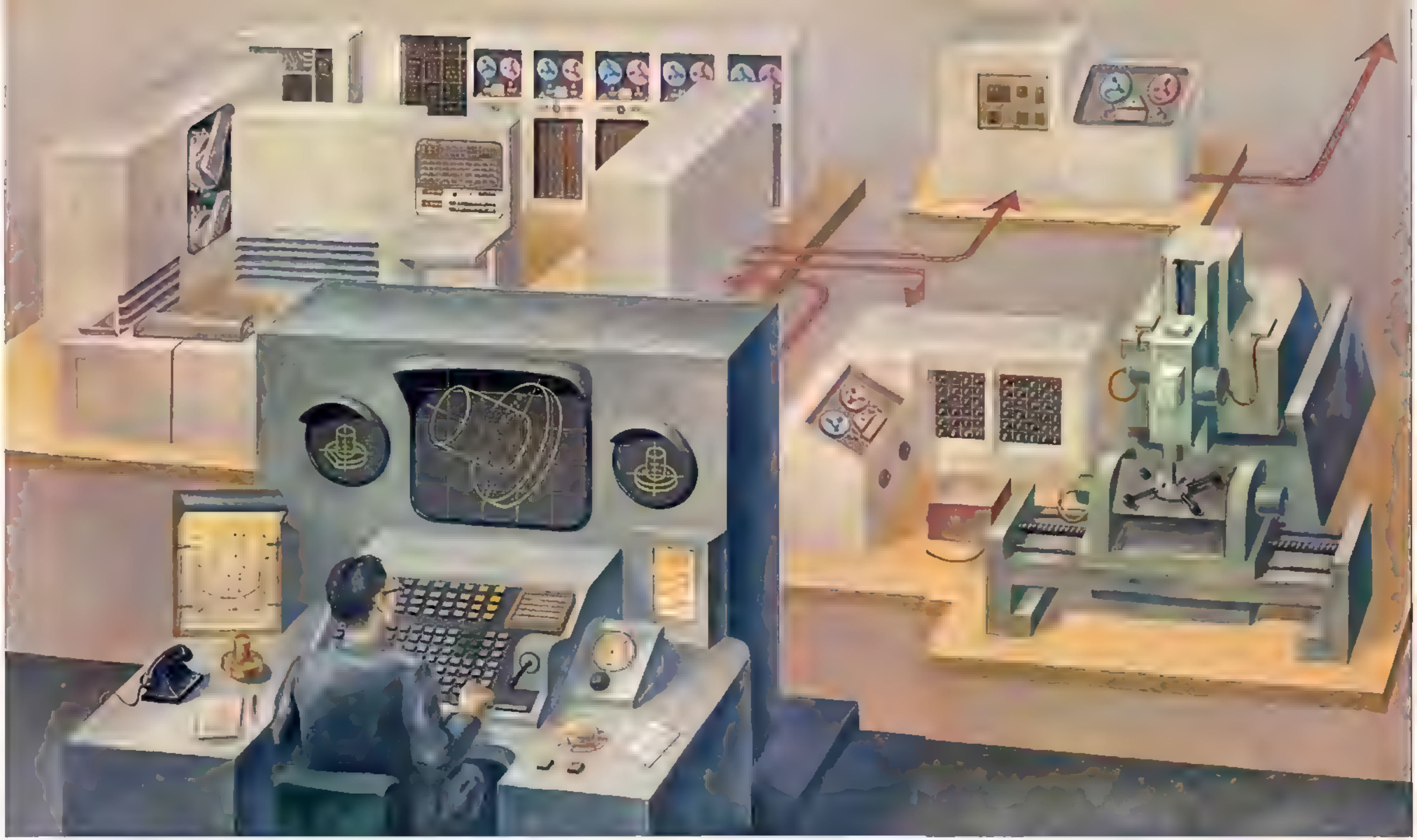
At Bell and Howell,
delicate mechanisms are protected from airborne dust.

At Grumman Aircraft,
increased efficiency helps build more planes.

At Elgin National Watch,
tiny watch parts are guarded from corrosion.



Max Gschwind

No science-fiction fantasy, this Design Machine could be built with the computers and automatic-control techniques available today. Dr. Price, who designed the Designer, estimates that it would be able to create in a matter of seconds pictures of machine parts that now take a draftsman many hours to draw. And as it "drew" a picture, the Machine would simultaneously create a mathematical model of the part in its internal memory. This model, transferred to magnetic tape, could then be used to guide automatic machine tools in creating the part out of metal. While the Design Machine would cost a great deal to develop, it would enormously accelerate the speed with which new mechanical devices of all types could be developed.

In the drawing, the engineer at the control station has just "typed" out a description of the part shown in the pencil sketch to his left, and is studying its shape as the Design Machine shows it to him, in three dimensions, on its central screen. (To get the 3-D effect he wears Polaroid glasses. The two small screens are used to show him other views, or previous designs.) In the background, at left, is a large digital computer, such as the Univac Scientific or the I.B.M. 704, supplemented by a special Design Machine control unit. In the right foreground is the automatized machine shop. Behind the shop is a station where the computer calculations can be retaped in a form suitable for guiding production machines in an automatic factory. (To learn how the computer can be "told" what the engineer wants to construct, see next page.)

Technology

How to Speed Up Invention

Modern technology's latest products are developed by methods little changed since Edison's day. Here are eight recipes for modernizing R. and D. One proposal—the Design Machine—may sound fantastic. It isn't.

by George R. Price

It is an anomaly of our industrial system that while both products and production methods change rapidly, keeping in step with advances in science and technology, the applied research and development through which the world of tomorrow is being designed is itself carried on largely by methods of yesterday. A machinist from 1906 visiting a modern automobile or aircraft factory would find himself in a strange world of shell molding, centerless grinding, powder metallurgy, inert-gas arc welding, chemical milling, and so forth, but in the experimental model shops he would observe principally techniques and tools (lathes, drill presses, milling machines) that were in use a century ago. And a draftsman of 1856, though bewildered by the strange mechanisms to be drawn, would quickly find himself at home with the drafting methods of 1956.

There are three main reasons for this backwardness. First, research and development are inherently more difficult to modernize or mechanize than is production. Second, we tend to underestimate the value of investment in R. and D. because the profits from new product design are comparatively uncertain and may not be realized for a long time. And third, we simply don't notice that our design methods are antiquated, for a dazzling profusion of bright new products deludes us into believing that the R. and D. departments must themselves be the most modern and advanced parts of any organization.

Though we rarely realize it, it seems to be habit and custom and not complexity of problems that limit the speed of R. and D. In some industries the established pace is comparatively rapid, but we know that even where our R. and D. tempo is swiftest, as in the aeronautical industry, it is still slower than it could be. The Russians, with their Bison bomber, took only four or five years to go through the same developmental cycle that required eight years for the Boeing B-52, and they may have almost caught up with us in nuclear technology.

How can U.S. manufacturers accelerate their present research and engineering methods in order to bring them up to the level of their production methods? This article offers eight proposals for speeding up R. and D., ranging from simple administrative steps that can be adopted immediately, to certain measures that will in themselves require new advances in technology. Admittedly the most audacious proposal on the list is the Design Machine, which would automatize the drafting room and model shop, and thus vastly shorten the time required to develop new machines of every type, from waffle irons to jet aircraft.

The Design Machine may appear to be a wild fling into a too distant future. But what is needed in the whole field is a totally new concept of what it is possible to achieve. There is a legend that King Henry Christophe, of Haiti, one day assigned one hundred men to haul a cannon to the great mountaintop citadel of La Ferrière by nightfall. Since his custom was to execute anyone who failed to carry out his commands, the men grew terrified when after several hours they had made little progress; they begged the King for more help. His answer was to execute half of the hundred on the spot, and tell the remaining fifty that they too would die if the cannon was not at La Ferrière by sunset. The cannon got there.

The fifty surviving laborers obviously had acquired a new way of looking at things, so that all at once they were able to see how to get the job done in the time available. And this

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PLASKON MOLDED COLOR

MATERIAL: PLASKON **PRODUCT:** WAKEFIELD "COMMODORE" ILLUMINATING REFLECTOR **DIAMETER:** 26½" (LARGEST PLASTIC MOLDING EVER PRODUCED.) **WEIGHT:** 5 LBS. (LIGHTEST UNIT OF ITS SIZE EVER PRODUCED.) **REMARKS:** ILLUMINATING EFFICIENCY UNUSUALLY HIGH, SHIPPING COST AND BREAKAGE UNUSUALLY LOW, SIMPLER MAINTENANCE.

Plaskon is among the most versatile of molded plastics, being widely used for home appliances, radio cabinets, refrigerator parts and packages—as well as lighting reflectors. Plaskon has a permanent lustre, unlimited color range.

PLASKON COMPANY, INC. . . . . . . 2125 SYLVAN AVENUE . . . . . TOLEDO, OHIO

Fortune

One Dollar a Copy OCTOBER 1937 Ten Dollars a Year

Bleached Sulphite Pulp Demand Brings Price Rise

© National Geographic Society

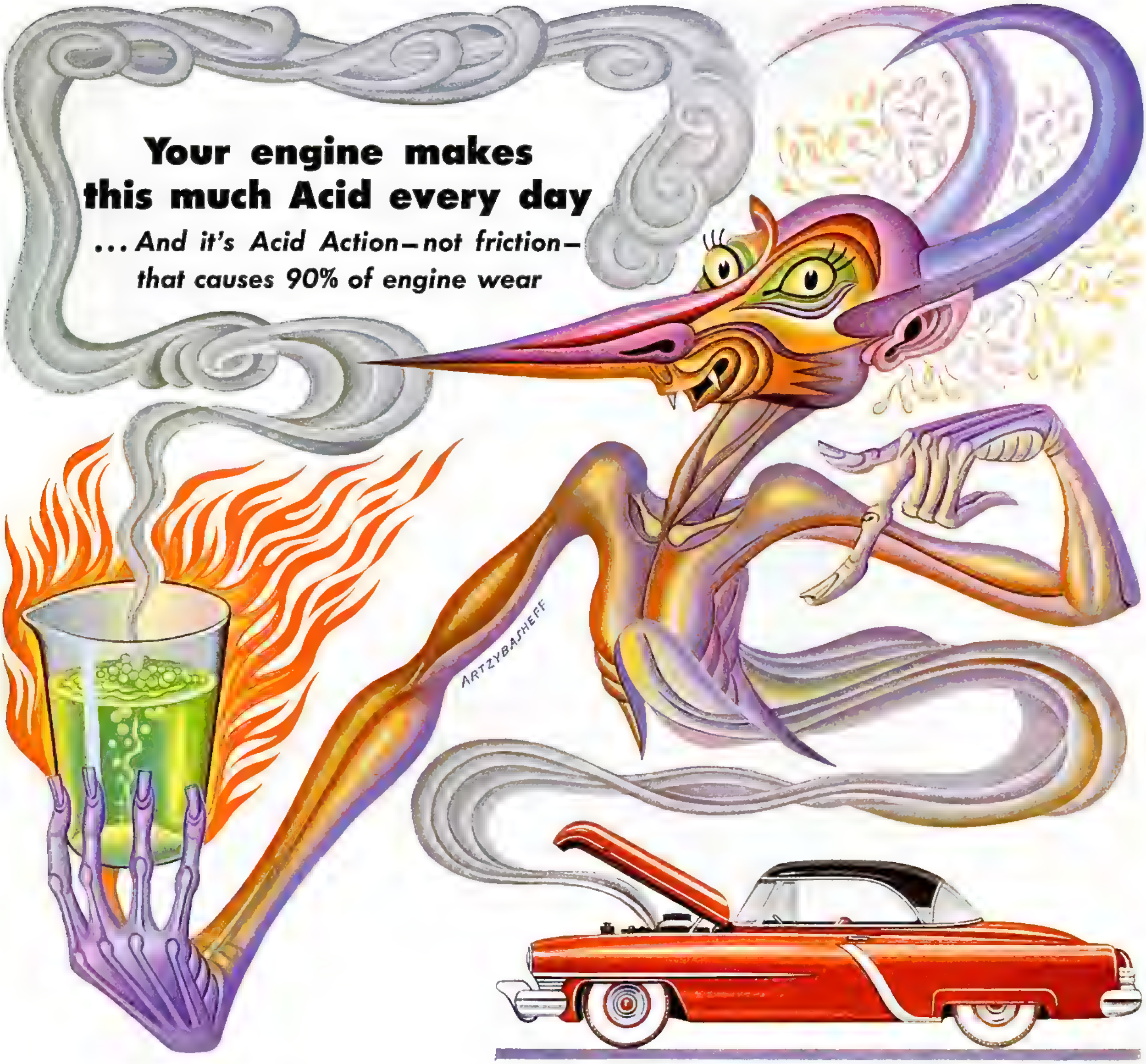
Painting by Thornton Oakley

Fine Steel Pours Forth from a Monstrous Electric Furnace

PM XR

Your engine makes this much Acid every day

...And it's Acid Action—not friction—that causes 90% of engine wear



New Alkaline Shell X-100 Motor Oil counteracts Acid Action

If you are a typical motorist, in a normal day's driving:—a pint or more of acid is formed and passes through your car's engine, and it's acid action, not friction, that causes 90% of your engine wear. To neutralize the harmful effect of this acid, Shell Research has produced an alkaline motor oil—Shell X-100. Fortified with alkaline "X" safety factors, it neutralizes the acid action, prolonging the life of your engine.

The new Shell X-100 is a Premium Motor Oil. It is a Heavy Duty Motor Oil. In addition, it contains positive cleansing factors that help protect hydraulic valve lifters and other vital parts from fouling deposits.

Shell X-100 is the finest motor oil money can buy. Let your Shell dealer give your engine the protection of this new alkaline Shell X-100 Motor Oil today.

It's Incomparable!

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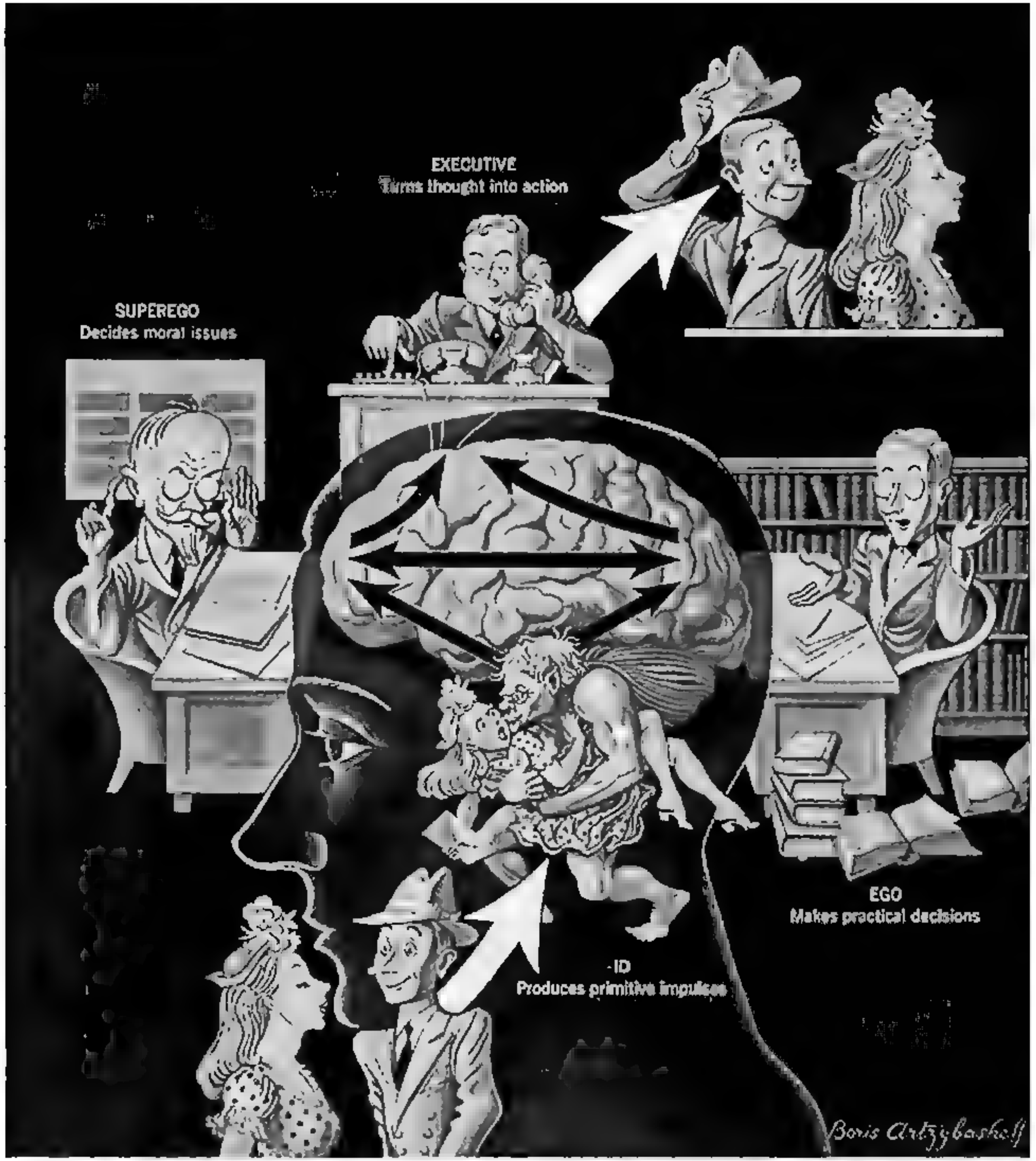
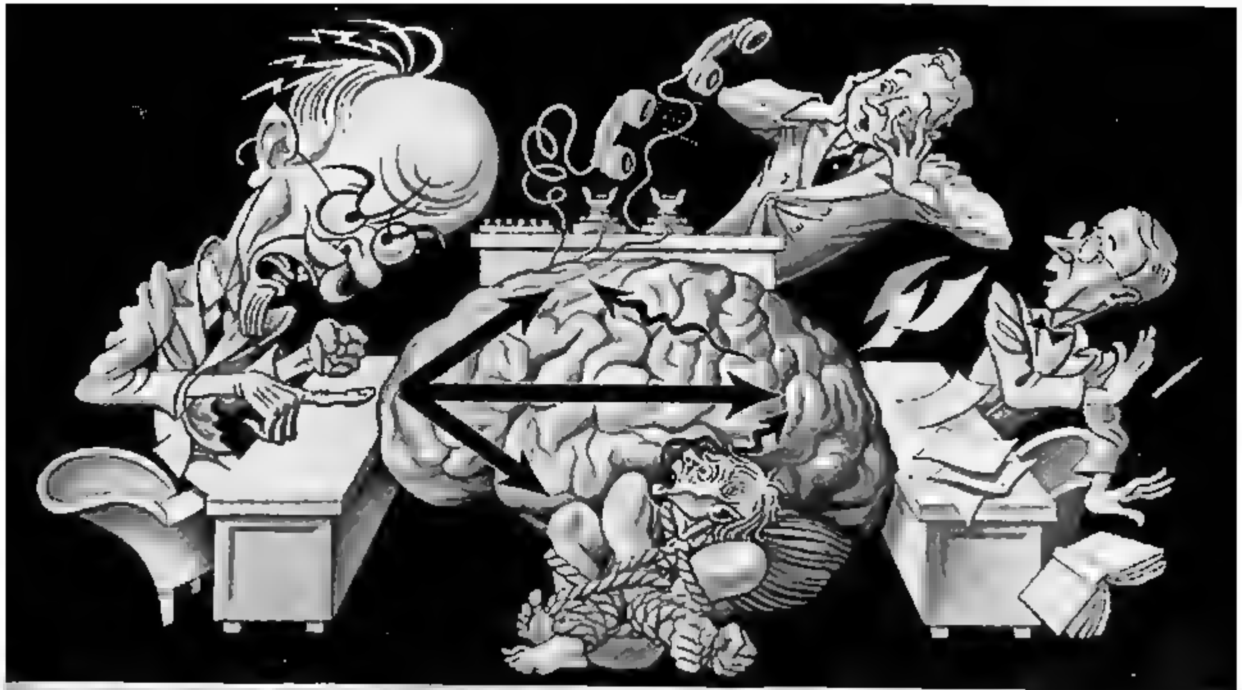
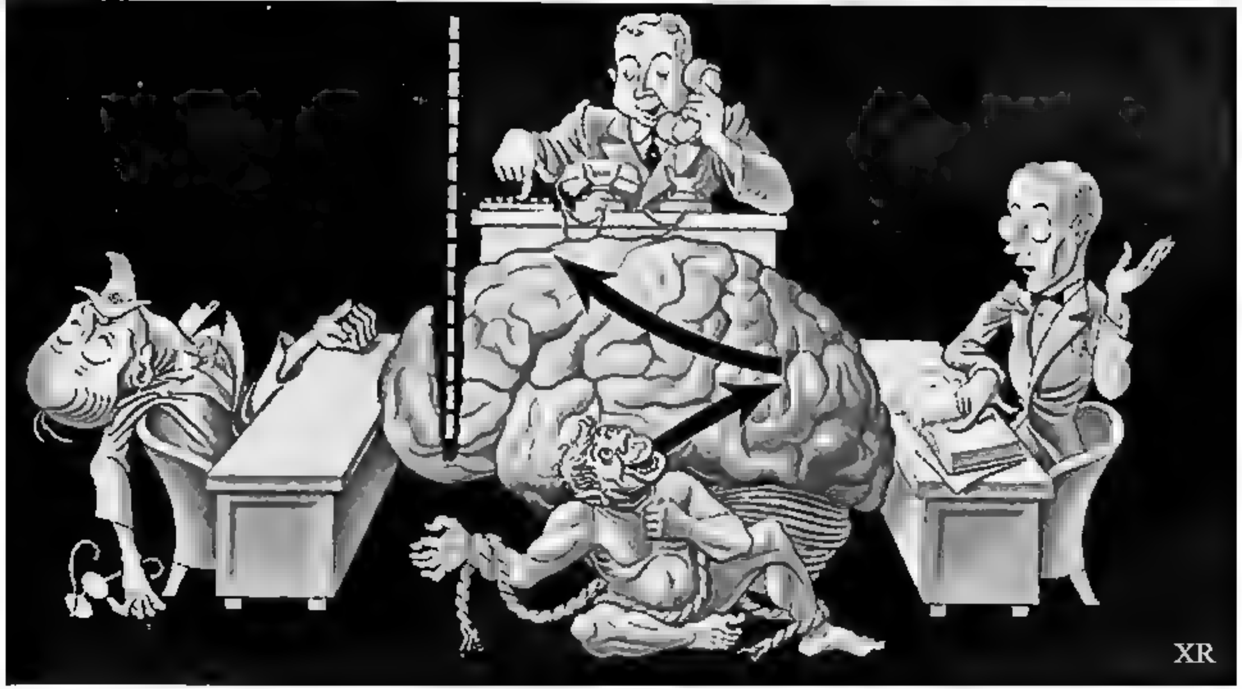

EXECUTIVE
Turns thought into action
SUPEREGO
Decides moral issues
EGO
Makes practical decisions
ID
Produces primitive impulses
Boris Artzybasheff



N MIND OF AGITATED DEPRESSIVE, OVERBEARING CONSCIENCE (LEFT) DEPRESSES IMPULSE (BOTTOM), DISRUPTS JUDGMENT (RIGHT) AND EXECUTIVE FUNCTION (TOP



The man who thinks for himself knows... Only Viceroy has a thinking man's filter... a smoking man's taste!

© 1959, Brown & Williamson Tobacco Corp.

JEAN CARLU
Osram
THE WONDERFUL LAMP
XR

They know where they're going – by Decca

Navigation by Decca is going world wide. Among international air lines Seaboard World, Flying Tiger and BEA are equipping new fleets with Decca because they find that significant economic advantages result both en route and in terminal areas. In addition, a vital reduction in pilot workload is ensured by Decca pictorial presentation, developed over 18 years and perfected through 3,000,000 flying hours. The RAF choose Decca again and again for aircraft of many types. U.S. Army helicopters, evacuating wounded in Vietnam, rely on it for pin-point navigation over difficult terrain. In all, well over 2,000 aircraft are daily operating at greater efficiency thanks to Decca. At sea the Decca Navigator is installed in over 13,000 ships of all classes sailing in most of the important maritime areas of the world. It was the speed and accuracy of the Decca operation off Palomares that played so vital a role in recovering a hydrogen bomb from the seabed. Varied applications such as these prove the reliability, accuracy and flexibility of the Decca system.

The Decca Navigator Company Limited, London

BEA
ROYAL AIR FORCE AIR SUPPORT COMMAND
ALUMINAUT
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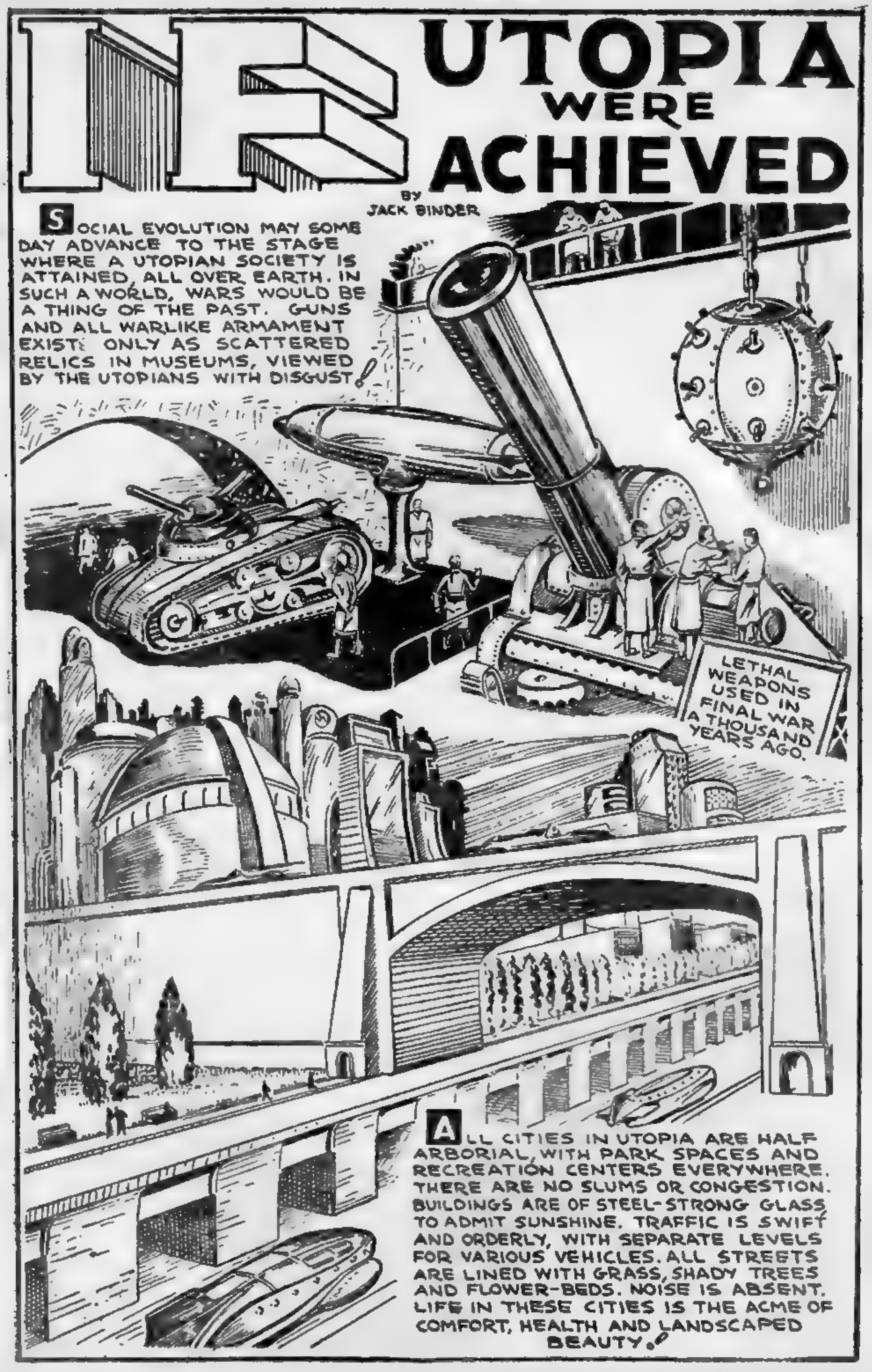
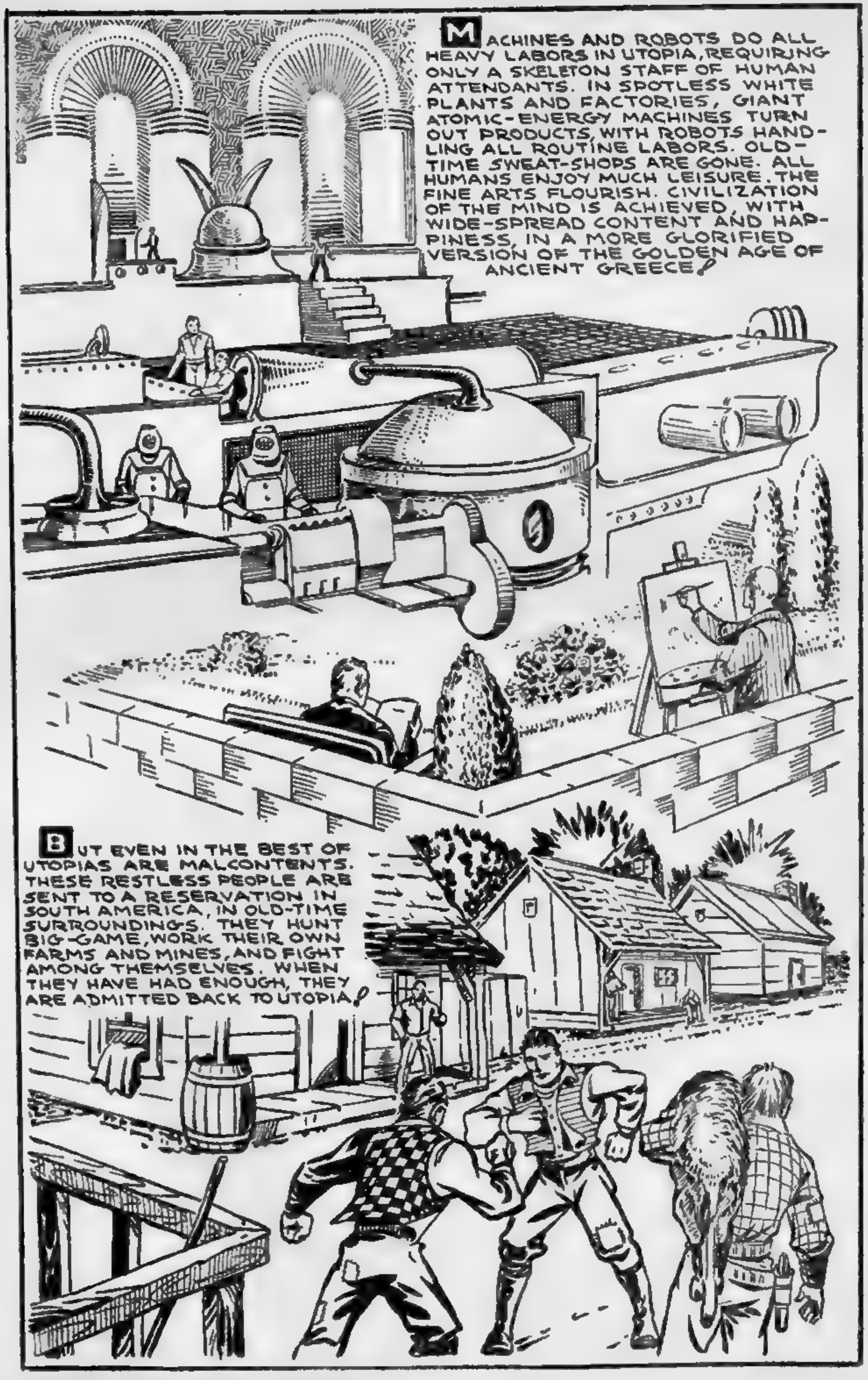

IF UTOPIA WERE ACHIEVED
BY JACK BINDER
SOCIAL EVOLUTION MAY SOME DAY ADVANCE TO THE STAGE WHERE A UTOPIAN SOCIETY IS ATTAINED, ALL OVER EARTH. IN SUCH A WORLD, WARS WOULD BE A THING OF THE PAST. GUNS AND ALL WARLIKE ARMAMENT EXIST ONLY AS SCATTERED RELICS IN MUSEUMS, VIEWED BY THE UTOPIANS WITH DISGUST!
LETHAL WEAPONS USED IN FINAL WAR A THOUSAND YEARS AGO.
ALL CITIES IN UTOPIA ARE HALF ARBORIAL, WITH PARK SPACES AND RECREATION CENTERS EVERYWHERE. THERE ARE NO SLUMS OR CONGESTION. BUILDINGS ARE OF STEEL-STRONG GLASS TO ADMIT SUNSHINE. TRAFFIC IS SWIFT AND ORDERLY, WITH SEPARATE LEVELS FOR VARIOUS VEHICLES. ALL STREETS ARE LINED WITH GRASS, SHADY TREES AND FLOWER-BEDS. NOISE IS ABSENT. LIFE IN THESE CITIES IS THE ACME OF COMFORT, HEALTH AND LANDSCAPED BEAUTY!


MACHINES AND ROBOTS DO ALL HEAVY LABORS IN UTOPIA, REQUIRING ONLY A SKELETON STAFF OF HUMAN ATTENDANTS. IN SPOTLESS WHITE PLANTS AND FACTORIES, GIANT ATOMIC-ENERGY MACHINES TURN OUT PRODUCTS, WITH ROBOTS HANDLING ALL ROUTINE LABORS. OLD-TIME SWEAT-SHOPS ARE GONE. ALL HUMANS ENJOY MUCH LEISURE. THE FINE ARTS FLOURISH. CIVILIZATION OF THE MIND IS ACHIEVED, WITH WIDE-SPREAD CONTENT AND HAPPINESS, IN A MORE GLORIFIED VERSION OF THE GOLDEN AGE OF ANCIENT GREECE!
BUT EVEN IN THE BEST OF UTOPIAS ARE MALCONTENTS. THESE RESTLESS PEOPLE ARE SENT TO A RESERVATION IN SOUTH AMERICA, IN OLD-TIME SURROUNDINGS. THEY HUNT BIG-GAME, WORK THEIR OWN FARMS AND MINES, AND FIGHT AMONG THEMSELVES. WHEN THEY HAVE HAD ENOUGH, THEY ARE ADMITTED BACK TO UTOPIA!

Coming Next Month: IF MAN VISITED THE EARTH'S CORE

The Care of Your Teeth

How to prevent dental disease and maintain the health of your teeth and gums

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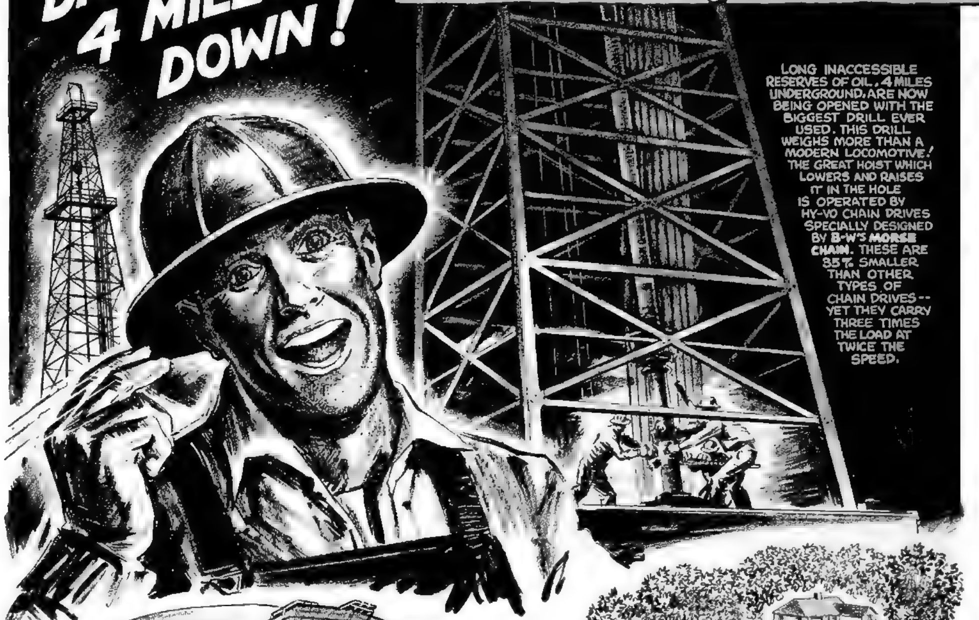
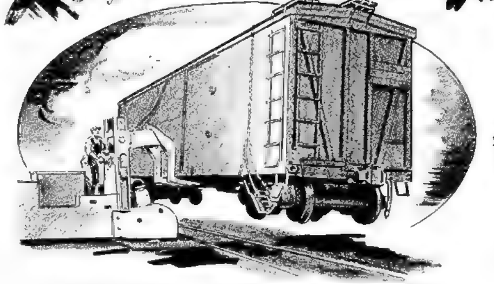
RIPLEY'S Believe It or Not!

ENGINEERING
B-W
PRODUCTION

NEW OIL DISCOVERED 4 MILES DOWN!

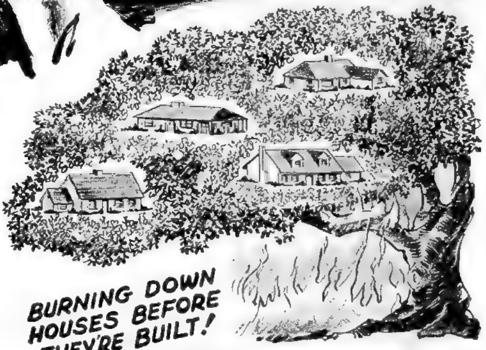


LONG INACCESSIBLE RESERVES OF OIL, 4 MILES UNDERGROUND, ARE NOW BEING OPENED WITH THE BIGGEST DRILL EVER USED. THIS DRILL WEIGHS MORE THAN A MODERN LOCOMOTIVE! THE GREAT HOIST WHICH LOWERS AND RAISES IT IN THE HOLE IS OPERATED BY HY-VO CHAIN DRIVES SPECIALLY DESIGNED BY **B-W'S MORSE CHAIN**. THESE ARE 35% SMALLER THAN OTHER TYPES OF CHAIN DRIVES -- YET THEY CARRY THREE TIMES THE LOAD AT TWICE THE SPEED.



14-INCH MUSCLE LIFTS LOADED BOXCAR!

THIS MIGHTY FORK TRUCK RAISES **40** TONS WITHOUT A GRUNT. IT GETS ITS TREMENDOUS STRENGTH FROM A **B-W PESCO PUMP** LITTLE BIGGER THAN AN AVERAGE MAN'S BICEPS. IN STEEL MILLS, THE POWER AND MOBILITY OF THIS LIFTER HAVE INCREASED PRODUCTION, CUT COSTS.



BURNING DOWN HOUSES BEFORE THEY'RE BUILT!

EVERY YEAR, OVER 200,000 FOREST FIRES BLAZE ACROSS AMERICA. THEY BURN UP ENOUGH TIMBER TO BUILD 80,000 FIVE-ROOM HOUSES. WE ALL LOSE THROUGH SUCH DESTRUCTION. **NINE** OUT OF **TEN** OF THESE FIRES ARE MAN-MADE! SO BE CAREFUL. CRUSH OUT CIGARETTES. USE YOUR ASHTRAY WHEN YOU DRIVE. BREAK MATCHES ... DROWN CAMPFIRES.

HELPING OIL DRILLERS HIT A NEW HIGH IN GOING LOW... GEARING CARS FOR PRIZE-WINNING MILEAGE... MAKING STEEL SANDWICHES TO SATISFY FARMERS.

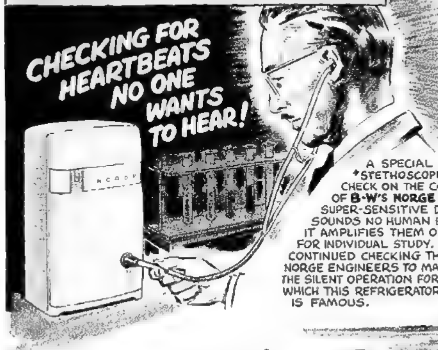
IN SO MANY WAYS **B-W** SKILL AND INGENUITY TOUCH THE LIFE OF ALMOST EVERY AMERICAN EVERY DAY.

*FOR EXAMPLE: **19** OUT OF THE **20** MAKES OF MOTORCARS CONTAIN ESSENTIAL PARTS BY **BORG-WARNER**. EVERY COMMERCIAL PLANE AND MANY SHIPS AFLOAT HAVE ABOARD VITAL **B-W** EQUIPMENT. **9** OUT OF **10** FARMS SPEED FOOD PRODUCTION WITH **B-W** EQUIPPED MACHINES. AND MILLIONS ENJOY THE OUTSTANDING ADVANTAGES OF **B-W** HOME EQUIPMENT AND APPLIANCES.*

NO CAR EVER WON MOBILGAS ECONOMY RUN WITHOUT B-W OVERDRIVE!

IN AMERICA'S TOUGHEST GAS MILEAGE CONTEST, THE ANNUAL MOBILGAS ECONOMY RUN, THE TOP WINNER EVERY SINGLE TIME HAS BEEN A CAR EQUIPPED WITH B-W OVERDRIVE. THIS TRANSMISSION SAVES GAS BY AUTOMATICALLY CUTTING ENGINE REVOLUTIONS 30% AT CRUISING SPEEDS. MADE BY **B-W'S WARNER GEAR**, OVERDRIVE IS AVAILABLE ON 10 LEADING MAKES OF CARS.

CHECKING FOR HEARTBEATS NO ONE WANTS TO HEAR!



A SPECIAL ENGINEER'S "STETHOSCOPE" IS USED TO CHECK ON THE COLD-MAKING HEART OF **B-W'S NORGE** REFRIGERATOR. THIS SUPER-SENSITIVE DEVICE WILL PICK UP SOUNDS NO HUMAN EAR CAN DETECT. IT AMPLIFIES THEM ONE AT A TIME FOR INDIVIDUAL STUDY. IT IS SUCH CONTINUED CHECKING THAT HELPS NORGE ENGINEERS TO MAINTAIN THE SILENT OPERATION FOR WHICH THIS REFRIGERATOR IS FAMOUS.

PHARAOH'S FARMERS REJECTED METAL PLOWS!

FOR CENTURIES, ANCIENT EGYPTIANS PREFERRED PLOWS OF STONE. THE METAL PLOWS OF THAT TIME LACKED TOUGHNESS, WORE OUT TOO QUICKLY. TODAY, EVEN STONE CAN'T EQUAL THE DURABILITY OF THE TILLAGE STEEL **B-W's INGERSOLL STEEL** MAKES FOR PLOW AND IMPLEMENT MANUFACTURERS. MADE LIKE A SANDWICH, THIS STEEL HAS SUPER-HARD SURFACES FOR LONG WEAR AND A SOFT CENTER TO CUSHION AGAINST BREAKAGE.

185 PRODUCTS IN ALL ARE MADE BY **BORG-WARNER**

These units form BORG-WARNER, Executive Offices, 310 S. Michigan Ave., Chicago: **BORG & BECK • BORG-WARNER INTERNATIONAL • BORG WARNER SERVICE PARTS • CALUMET STEEL • DETROIT GEAR • FRANKLIN STEEL • INGERSOLL STEEL • LONG MANUFACTURING • LONG MANUFACTURING CO., LTD. • MARBON • MARVEL-SCHEBLER PRODUCTS • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • MORSE CHAIN, LTD. • NORGE • NORGE-HEAT • PESCO PRODUCTS • ROCKFORD CLUTCH SPRING DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR • WARNER GEAR CO., LTD. • WOOSTER DIVISION**

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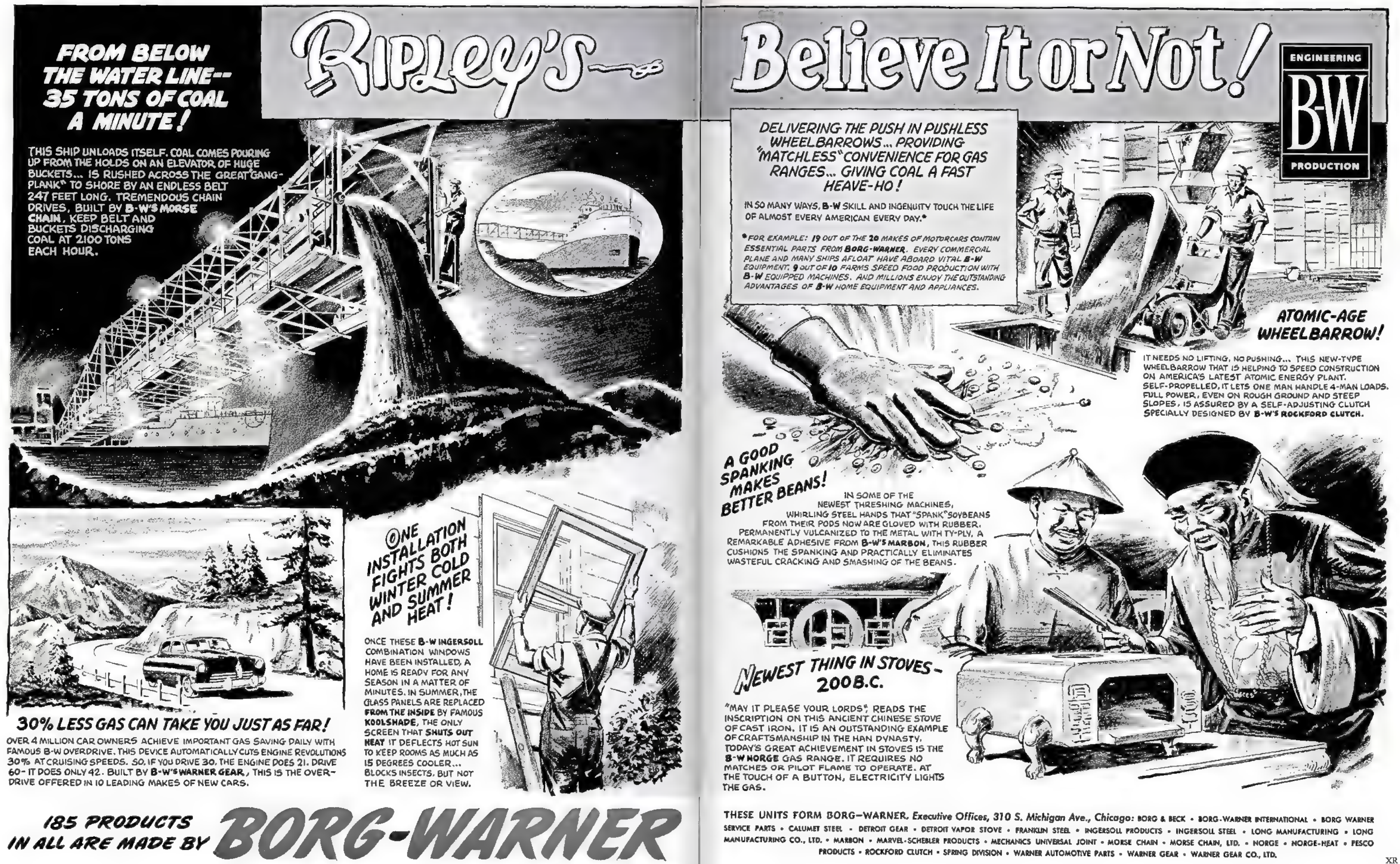

RIPLEY'S — BELIEVE IT OR NOT!

ENGINEERING
B-W
PRODUCTION

FROM BELOW THE WATER LINE-- 35 TONS OF COAL A MINUTE!

THIS SHIP UNLOADS ITSELF. COAL COMES POURING UP FROM THE HOLDS ON AN ELEVATOR OF HUGE BUCKETS... IS RUSHED ACROSS THE GREAT "GANG-PLANK" TO SHORE BY AN ENDLESS BELT 247 FEET LONG. TREMENDOUS CHAIN DRIVES, BUILT BY **B-W'S MORSE CHAIN**, KEEP BELT AND BUCKETS DISCHARGING COAL AT 2100 TONS EACH HOUR.

30% LESS GAS CAN TAKE YOU JUST AS FAR!

OVER 4 MILLION CAR OWNERS ACHIEVE IMPORTANT GAS SAVING DAILY WITH FAMOUS B-W OVERDRIVE. THIS DEVICE AUTOMATICALLY CUTS ENGINE REVOLUTIONS 30% AT CRUISING SPEEDS. SO, IF YOU DRIVE 30, THE ENGINE DOES 21. DRIVE 60- IT DOES ONLY 42. BUILT BY **B-W'S WARNER GEAR**, THIS IS THE OVERDRIVE OFFERED IN 10 LEADING MAKES OF NEW CARS.

ONE INSTALLATION FIGHTS BOTH WINTER COLD AND SUMMER HEAT!

ONCE THESE **B-W INGERSOLL** COMBINATION WINDOWS HAVE BEEN INSTALLED, A HOME IS READY FOR ANY SEASON IN A MATTER OF MINUTES. IN SUMMER, THE GLASS PANELS ARE REPLACED **FROM THE INSIDE** BY FAMOUS **KOOLSHADE**, THE ONLY SCREEN THAT **SHUTS OUT HEAT**. IT DEFLECTS HOT SUN TO KEEP ROOMS AS MUCH AS 15 DEGREES COOLER... BLOCKS INSECTS, BUT NOT THE BREEZE OR VIEW.

DELIVERING THE PUSH IN PUSHLESS WHEELBARROWS... PROVIDING "MATCHLESS" CONVENIENCE FOR GAS RANGES... GIVING COAL A FAST HEAVE-HO!

IN SO MANY WAYS, **B-W** SKILL AND INGENUITY TOUCH THE LIFE OF ALMOST EVERY AMERICAN EVERY DAY.*

FOR EXAMPLE: **19 OUT OF THE **20** MAKES OF MOTORCARS CONTAIN ESSENTIAL PARTS FROM **BORG-WARNER**. EVERY COMMERCIAL PLANE AND MANY SHIPS AFLOAT HAVE ABOARD VITAL **B-W** EQUIPMENT. **9** OUT OF **10** FARMS SPEED FOOD PRODUCTION WITH **B-W** EQUIPPED MACHINES. AND MILLIONS ENJOY THE OUTSTANDING ADVANTAGES OF **B-W** HOME EQUIPMENT AND APPLIANCES.*

ATOMIC-AGE WHEELBARROW!

IT NEEDS NO LIFTING, NO PUSHING... THIS NEW-TYPE WHEELBARROW THAT IS HELPING TO SPEED CONSTRUCTION ON AMERICA'S LATEST ATOMIC ENERGY PLANT. SELF-PROPELLED, IT LETS ONE MAN HANDLE 4-MAN LOADS. FULL POWER, EVEN ON ROUGH GROUND AND STEEP SLOPES, IS ASSURED BY A SELF-ADJUSTING CLUTCH SPECIALLY DESIGNED BY **B-W'S ROCKFORD CLUTCH**.

A GOOD SPANKING MAKES BETTER BEANS!

IN SOME OF THE NEWEST THRESHING MACHINES, WHIRLING STEEL HANDS THAT "SPANK" SOYBEANS FROM THEIR PODS NOW ARE GLOVED WITH RUBBER. PERMANENTLY VULCANIZED TO THE METAL WITH TY-PLY, A REMARKABLE ADHESIVE FROM **B-W'S MARBON**, THIS RUBBER CUSHIONS THE SPANKING AND PRACTICALLY ELIMINATES WASTEFUL CRACKING AND SMASHING OF THE BEANS.

NEWEST THING IN STOVES- 200 B.C.

"MAY IT PLEASE YOUR LORDS", READS THE INSCRIPTION ON THIS ANCIENT CHINESE STOVE OF CAST IRON. IT IS AN OUTSTANDING EXAMPLE OF CRAFTSMANSHIP IN THE HAN DYNASTY. TODAY'S GREAT ACHIEVEMENT IN STOVES IS THE **B-W NORGE** GAS RANGE. IT REQUIRES NO MATCHES OR PILOT FLAME TO OPERATE. AT THE TOUCH OF A BUTTON, ELECTRICITY LIGHTS THE GAS.

185 PRODUCTS IN ALL ARE MADE BY BORG-WARNER

THESE UNITS FORM BORG—WARNER. *Executive Offices, 310 S. Michigan Ave., Chicago:* BORG & BECK • BORG-WARNER INTERNATIONAL • BORG WARNER SERVICE PARTS • CALUMET STEEL • DETROIT GEAR • DETROIT VAPOR STOVE • FRANKLIN STEEL • INGERSOLL PRODUCTS • INGERSOLL STEEL • LONG MANUFACTURING • LONG MANUFACTURING CO., LTD. • MARBON • MARVEL-SCHEBLER PRODUCTS • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • MORSE CHAIN, LTD. • NORGE • NORGE-HEAT • PESCO PRODUCTS • ROCKFORD CLUTCH • SPRING DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR • WARNER GEAR CO., LTD.

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RIPLEY'S — Believe It or Not!

ENGINEERING
B-W
PRODUCTION

NEWEST JET BOMBER NEEDS NO PILOT!

AMERICA'S NEW B-61 MATADOR USES INGENIOUS ELECTRONIC CONTROLS TO DO THE FLYING. CARRYING AN EXPLOSIVE LOAD, IT IS GUIDED AT TERRIFIC SPEED TO THE ASSIGNED TARGET, WHICH IT CRASHES INTO AND DESTROYS. POWER IS PROVIDED BY A HIGH SPEED TURBOJET ENGINE. AND THE SPECIAL PUMP WHICH REGULATES THE FLOW OF FUEL IN THE COMPLEX, HIGHLY SECRET B-61 IS MADE BY **B-W'S PESCO.**

SQUEEZING BIGGER VALUE OUT OF CONCRETE...TEACHING MOTORCARS HOW TO RELAX AND LIVE LONGER... PUTTING THE PUSH INTO SELF-FLYING BOMBERS!

IN SO MANY WAYS **B-W** SKILL AND INGENUITY TOUCH THE LIFE OF ALMOST EVERY AMERICAN EVERY DAY.

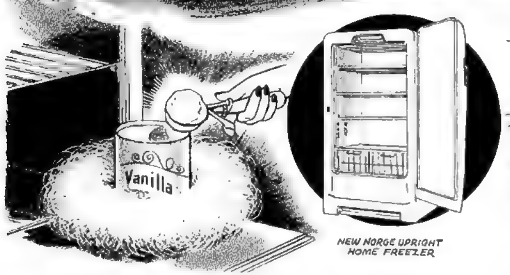
FOR EXAMPLE: ***19*** *OUT OF THE* ***20*** *MAKES OF MOTORCARS CONTAIN ESSENTIAL PARTS BY* ***BORG-WARNER****. EVERY COMMERCIAL PLANE AND MANY SHIPS AFLOAT HAVE ABOARD VITAL* ***B-W*** *EQUIPMENT.* ***9*** *OUT OF* ***10*** *FARMS SPEED FOOD PRODUCTION WITH* ***B-W*** *EQUIPPED MACHINES. AND MILLIONS ENJOY THE OUTSTANDING ADVANTAGES OF* ***B-W*** *HOME EQUIPMENT AND APPLIANCES.*

LAUREL LEAF WAS GREEK VOTER'S BALLOT!

THE ANCIENT GREEKS VOTED BY MARKING THE NAME OF THEIR CANDIDATE ON A LAUREL LEAF WITH A STYLUS. TODAY, AN "X" IN A CIRCLE IS ALL IT TAKES TO MAKE YOUR WISHES COUNT. SO **VOTE** — GO TO THE POLLS NOVEMBER 4th. VOTING IS ONE OF THE WORLD'S GREAT PRIVILEGES — ASK THE MAN WHO HAS LOST IT.

FROM A CAR RADIATOR — ENOUGH HEAT TO WARM 2 HOUSES!

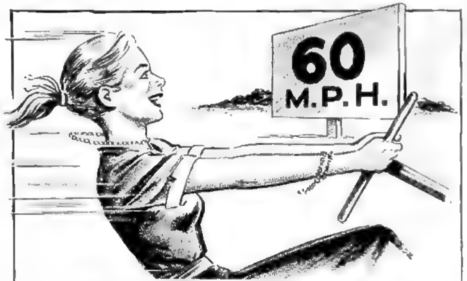
SO WELL DESIGNED IS THE CAR RADIATOR TURNED OUT BY **B-W'S LONG MANUFACTURING** THAT IN A SPACE JUST 19 X 22 INCHES THERE ARE OVER 25,000 SQUARE INCHES OF COOLING SURFACE. ACTUALLY, THIS RADIATOR CAN DISSIPATE ENOUGH HEAT TO MAINTAIN A 70° TEMPERATURE THROUGHOUT TWO 8-ROOM HOUSES IN ZERO WEATHER.



NEW NORGE UPRIGHT HOME FREEZER

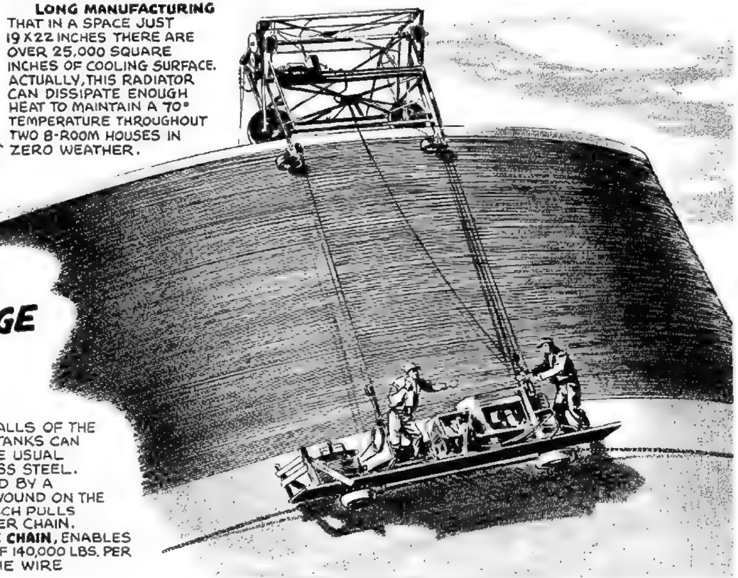
ICE CREAM BAKED AT 400° WITHOUT MELTING!

INSULATION USED IN THE NEW **B-W NORGE** UPRIGHT FREEZER IS SO EFFICIENT THAT ICE CREAM WRAPPED IN IT IS STILL FROZEN EVEN AFTER 45 MINUTES IN A 400° OVEN. IT KEEPS COLD **IN** AND HEAT **OUT**... ASSURES FAST FREEZING, STEADY CHILL IN THIS NEW SPACE-SAVING FREEZER. THE NORGE UPRIGHT PROVIDES PANTRY-HANDY SPACE FOR 400 POUNDS OF FROZEN FOOD WITHIN EASY REACH.



YOU CAN GO LIKE 60 — WITH YOUR ENGINE DOING 42!

ENGINE REVOLUTIONS ARE CUT 30% BY THE FAMOUS B-W OVERDRIVE. SO A CAR CAN TRAVEL 60 MILES AN HOUR...YET THE ENGINE WILL LOAF AT 42. AT 30, THE ENGINE GOES ONLY 21. THIS MEANS REAL GAS SAVINGS — EASIER RIDING — LESS ENGINE WEAR. MADE BY **B-W'S WARNER GEAR**, OVERDRIVE IS AVAILABLE ON 10 LEADING MAKES OF CARS.



WIRE GIRDLES TO KEEP STORAGE TANKS SLIM!

CONCRETE WALLS OF THE NEWEST STORAGE TANKS CAN NOW BE BUILT **HALF** THE USUAL THICKNESS — WITH 75% LESS STEEL. NEEDED STRENGTH IS SUPPLIED BY A FORM-FITTING GIRDLE OF WIRE WOUND ON THE TANK BY A UNIQUE MACHINE WHICH PULLS ITSELF ALONG AN ENDLESS ROLLER CHAIN. THIS CHAIN, MADE BY **B-W'S MORSE CHAIN**, ENABLES THE MACHINE TO DEVELOP A PULL OF 140,000 LBS. PER SQUARE INCH THAT STRETCHES THE WIRE TO TERRIFIC TIGHTNESS.

185 PRODUCTS IN ALL ARE MADE BY BORG-WARNER

These units form BORG-WARNER, Executive Offices, 310 S. Michigan Ave., Chicago: BORG & BECK • BORG-WARNER INTERNATIONAL • BORG WARNER SERVICE PARTS • CALUMET STEEL • CLEVELAND COMMUTATOR • DETROIT GEAR • FRANKLIN STEEL • INGERSOLL PRODUCTS • INGERSOLL STEEL • LONG MANUFACTURING • LONG MANUFACTURING CO., LTD. • MARBON • MARVEL-SCHEBLER PRODUCTS • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • MORSE CHAIN, LTD. • NORGE • NORGE-HEAT • PESCO PRODUCTS • REFLECTAL CORP. • ROCKFORD CLUTCH • SPRING DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR • WARNER GEAR CO., LTD. • WOOSTER DIVISION

THE SATURDAY EVENING

POST

JANUARY 10, 1948 15¢

TOLEDO

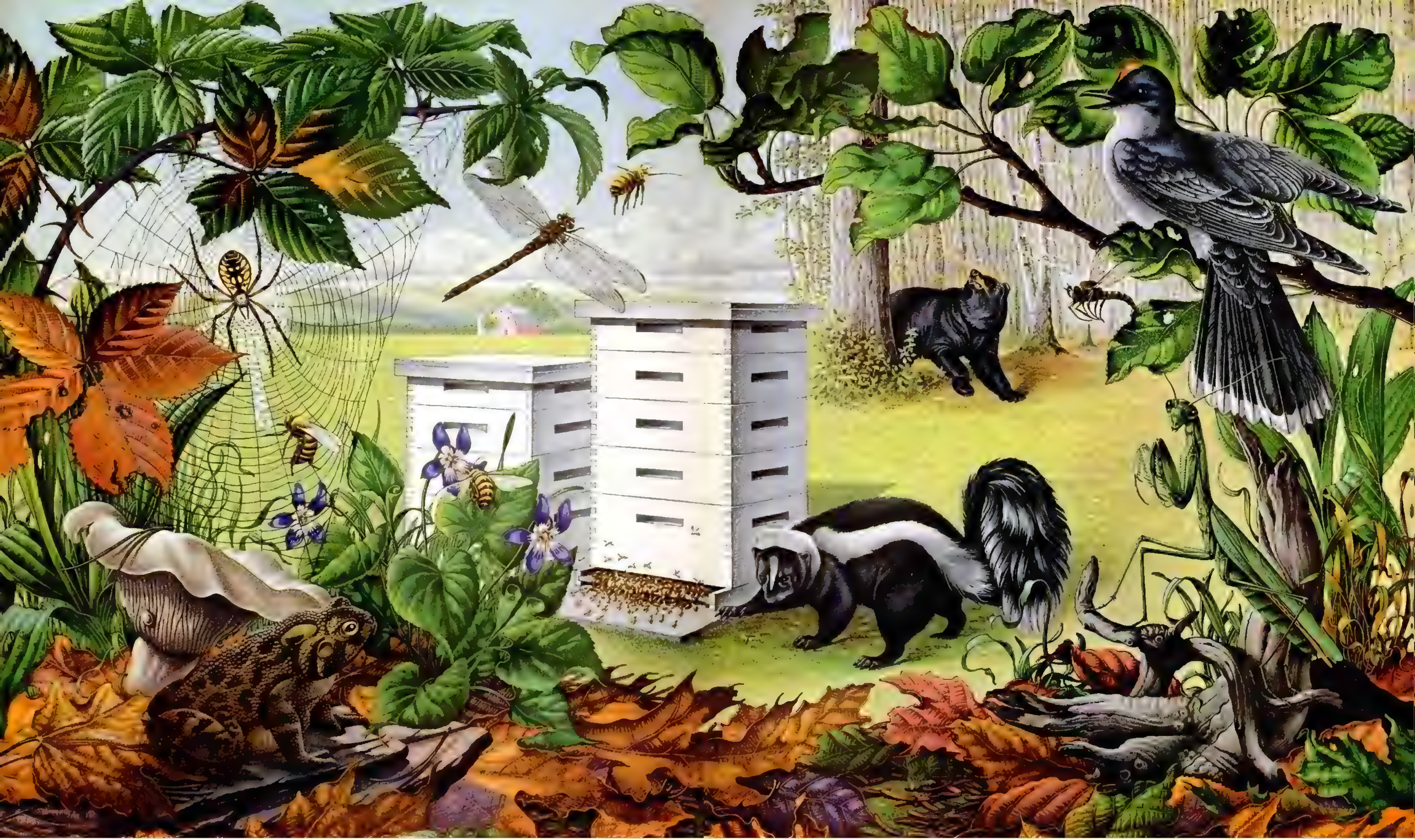
By Murphy

THE TH

OF ....

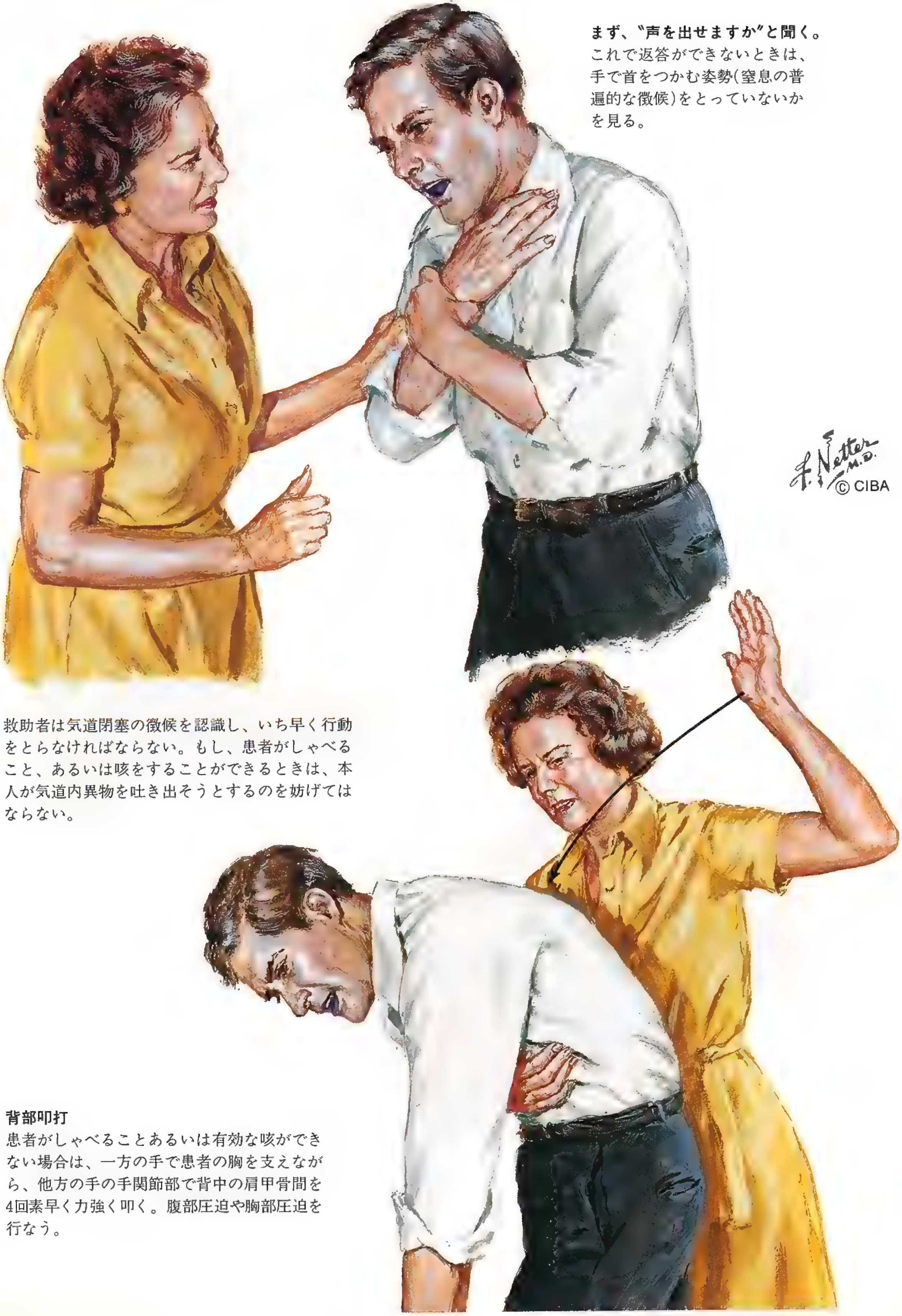
By Arthur W. Baum

PRICE IN BRITAIN
ONE SHILLING &
THREE PENCE
ROLLS HOUSE PUB CO
LONDON E C 4



ENEMIES OF BEES feast on the honey, the wax or the bees themselves. Garden spider (*left*) spins its web between hives and flower fields to trap foraging bees. Dragonfly (*top center*) scoops up bees in full flight and devours them on the wing. The bear (*right background*), traditional foe of bees, will destroy a comb and an entire colony to get at honey. Bear's thick hide protects it from stings, and it will overturn box hives as well as combs of wild bees. Kingbird or "bee martin" (*top right*) bites bees to suck out nectar and juices, then discards carcasses. Robber fly (below kingbird) has eyes covering almost the entire head, giving it exceptionally keen eyesight. Selecting a perch, it preys on all passing bees, catching them in mid-air and piercing them with its sharp, hooklike claws, then returning to its perch to suck out the juices with its projecting beak. Praying mantis (*lower right*) holds perfectly still, camouflaging itself until a bee flies too close, then darts out its forelegs to seize a victim and devour it. Skunk (*center*) loves honey but can seldom reach it. It also likes to eat bees, scratches at the hive until bees emerge, then deftly kills them with its paws. Toad (*lower left*) lurks near flowers and catches bees with its tongue, apparently unhurt by the bee's stinger. Mice (*previous page*) invade hives to steal honey or, during winter, to build nests. But one of the bees' worst enemies eats neither the bees nor their honey. This is the tiny larva of the wax moth which is born in crevices of hive and eats its way through the wax, destroying the comb and therefore the young bees and, in the end, sometimes the colony itself.

意識のある患者の気道閉塞



まず、〝声を出せますか〟と聞く。
これで返答ができないときは、手で首をつかむ姿勢（窒息の普遍的な徴候）をとっていないかを見る。

救助者は気道閉塞の徴候を認識し、いち早く行動をとらなければならない。もし、患者がしゃべること、あるいは咳をすることができるときは、本人が気道内異物を吐き出そうとするのを妨げてはならない。

背部叩打
患者がしゃべることあるいは有効な咳ができない場合は、一方の手で患者の胸を支えながら、他方の手の手関節部で背中の肩甲骨間を4回素早く力強く叩く。腹部圧迫や胸部圧迫を行なう。

Coca-Cola
Coca-Cola
Work Refreshed
Coca-Cola
5¢
Where you work
The pause that refreshes
with ice-cold Coca-Cola

XR

A STORY OF WHITE MAGIC

The forest found root in primeval muck. Incredible creatures writhed among its trees while dragon flies as big as eagles threshed about in the steaming air. Eons passed, the forest died and was transformed into a vast storehouse of natural resources, which includes deposits of coal and petroleum.

Today, through the white magic of synthetic organic chemistry, scientists draw upon the elements found in this primitive storehouse. They ingeniously combine them to form chemicals that contribute endlessly to industry and to mankind.

Some of these chemicals . . . which bear the formidable group name ethyleneglycolmonoalkylethers . . . are so versatile that from them come excellent bases for delicate perfumes as well as the fluid in the hydraulic brakes of automobiles. Others are present in dyes, insecticides, thinners, window cleaners, soluble oils, inks, and scores of useful things which they have improved.

Ethyleneglycolmonoalkylethers are but a few of 150 important synthetic organic chemicals which Carbide and Carbon Chemicals Corporation has developed. Using atoms of carbon, hydrogen, oxygen, and other elements as building blocks, chemists of this Corporation have produced—economically and in quantity—scores of chemicals that were once rare and costly.

Among these synthetic organic chemicals are essential raw materials for many important industries. They are used in lacquers and surface coatings . . . in pharmaceuticals and in finishing compounds for the textile industry. . . in rayon and other synthetic textile fibres . . . and in safety glass, synthetic resins, and anti-freezes. The list is almost endless.

These synthetic organic chemicals—which have made possible new and improved products at less cost to the consumer—now are available commercially. Your inquiries are invited.

• • •

The great strides made in the field of synthetic organic chemistry by Carbide and Carbon Chemicals Corporation have been facilitated tremendously by the important technical assistance in the use of special alloys and metals developed by Electro Metallurgical Company and the application of numerous processing methods perfected by The Linde Air Products Company—which companies also are Units of Union Carbide and Carbon Corporation.

CARBIDE AND CARBON CHEMICALS CORPORATION
Unit of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York, N. Y.

sept 1940

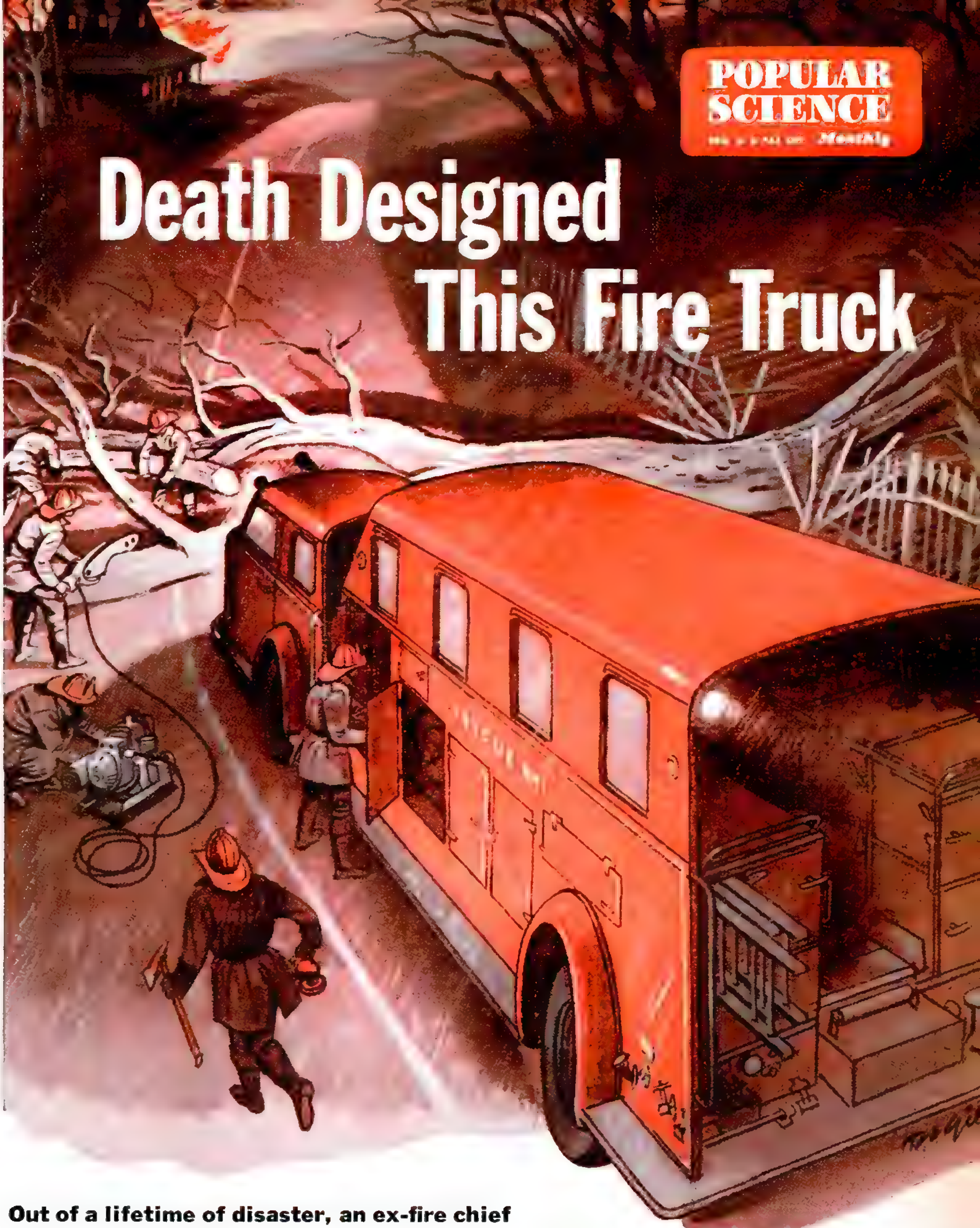
UCC

PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

Details on fossil plants from American Museum of Natural History, N. Y.

POPULAR SCIENCE
Monthly

Death Designed This Fire Truck



Out of a lifetime of disaster, an ex-fire chief has come up with a rescue car that's ready for anything.

By Gardner Soule

FORTY-TWO years of watching people die and property turn to ashes taught Charles A. McGinley that a really good fire department is one that is prepared for *every* kind of trouble. As a fireman and, for 22 years, as chief of the fire department of East Orange, N. J., he learned a great deal about how to cheat both death and destruction. What he learned has been built into an emergency truck, called Rescue No. 1, that's a trouble-shooting masterpiece. It's ready for anything, from explosions to heart attacks. Custom-built for East Orange, there's literally nothing like it in the world.

McGinley, now 66 and retired, no longer is on call when disaster occurs. Rescue No. 1, built from plans he helped prepare be-

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LIFE

BEGINNING
LIFE'S GREATEST SERIES
OF SCIENCE STORIES
IN PICTURES AND TEXT

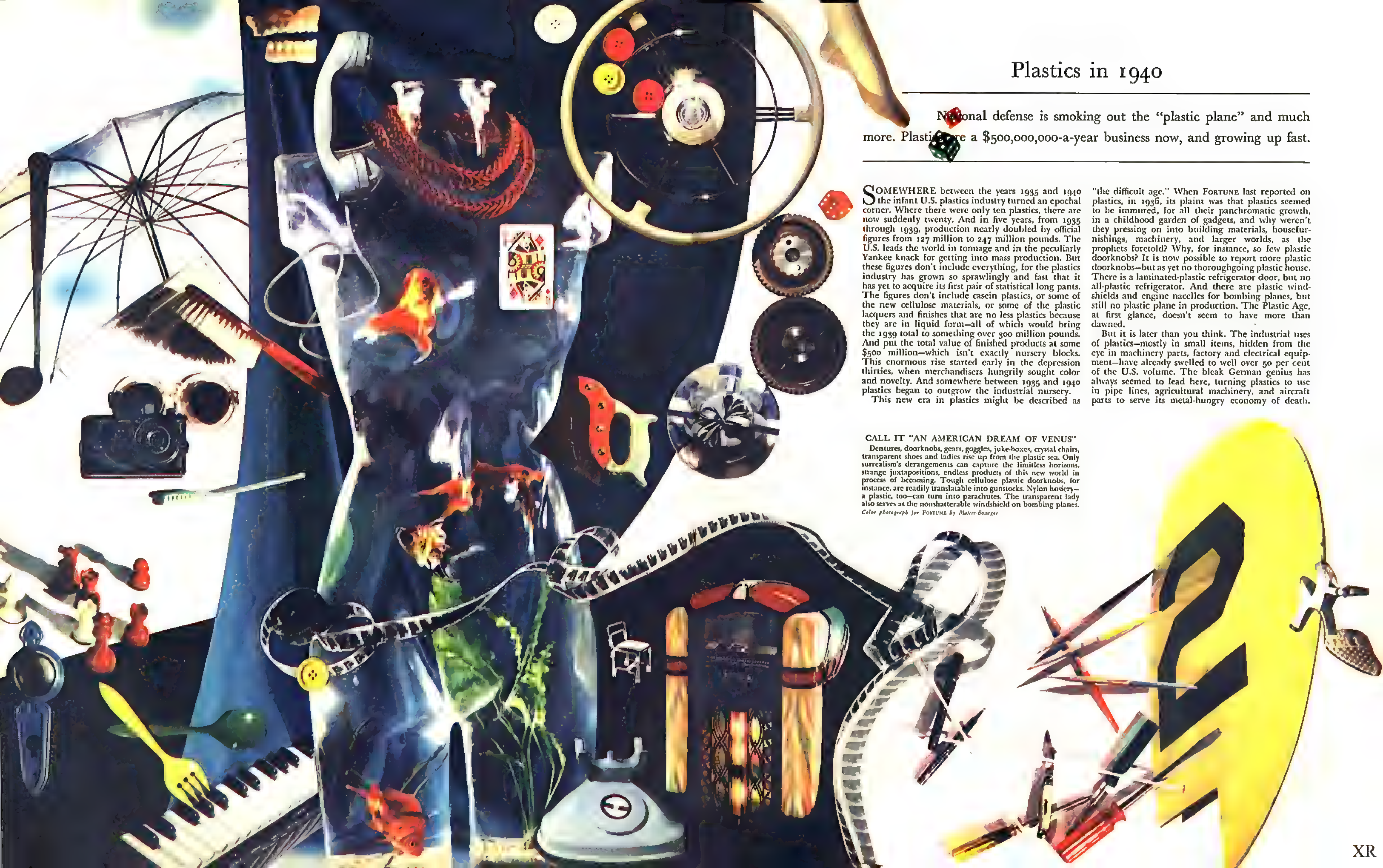
THE WORLD WE LIVE IN

PART I:

THE EARTH IS BORN

20 CENTS

DECEMBER 8, 1952



Plastics in 1940

National defense is smoking out the "plastic plane" and much more. Plastics are a $500,000,000-a-year business now, and growing up fast.

SOMEWHERE between the years 1935 and 1940 the infant U.S. plastics industry turned an epochal corner. Where there were only ten plastics, there are now suddenly twenty. And in five years, from 1935 through 1939, production nearly doubled by official figures from 127 million to 247 million pounds. The U.S. leads the world in tonnage and in the peculiarly Yankee knack for getting into mass production. But these figures don't include everything, for the plastics industry has grown so sprawlingly and fast that it has yet to acquire its first pair of statistical long pants. The figures don't include casein plastics, or some of the new cellulose materials, or some of the plastic lacquers and finishes that are no less plastics because they are in liquid form—all of which would bring the 1939 total to something over 300 million pounds. And put the total value of finished products at some $500 million—which isn't exactly nursery blocks. This enormous rise started early in the depression thirties, when merchandisers hungrily sought color and novelty. And somewhere between 1935 and 1940 plastics began to outgrow the industrial nursery.

This new era in plastics might be described as "the difficult age." When FORTUNE last reported on plastics, in 1936, its plaint was that plastics seemed to be immured, for all their panchromatic growth, in a childhood garden of gadgets, and why weren't they pressing on into building materials, housefurnishings, machinery, and larger worlds, as the prophets foretold? Why, for instance, so few plastic doorknobs? It is now possible to report more plastic doorknobs—but as yet no thoroughgoing plastic house. There is a laminated-plastic refrigerator door, but no all-plastic refrigerator. And there are plastic windshields and engine nacelles for bombing planes, but still no plastic plane in production. The Plastic Age, at first glance, doesn't seem to have more than dawned.

But it is later than you think. The industrial uses of plastics—mostly in small items, hidden from the eye in machinery parts, factory and electrical equipment—have already swelled to well over 50 per cent of the U.S. volume. The bleak German genius has always seemed to lead here, turning plastics to use in pipe lines, agricultural machinery, and aircraft parts to serve its metal-hungry economy of death.

CALL IT "AN AMERICAN DREAM OF VENUS"

Dentures, doorknobs, gears, goggles, juke-boxes, crystal chairs, transparent shoes and ladies rise up from the plastic sea. Only surrealism's derangements can capture the limitless horizons, strange juxtapositions, endless products of this new world in process of becoming. Tough cellulose plastic doorknobs, for instance, are readily translatable into gunstocks. Nylon hosiery—a plastic, too—can turn into parachutes. The transparent lady also serves as the nonshatterable windshield on bombing planes.

Color photograph for FORTUNE *by Matter-Bourges*

XR

FIRMLY ENTRENCHED IN PLASTICS

Reynolds

CONTINUES TO GROW!

One big reason why Reynolds Molded Plastics add new customers constantly and holds those who have stayed with them year after year is that its production tempo continues, and will continue, its long unbroken rise.

Considerable production equipment has recently been added which will enable Reynolds to accelerate its tremendous growth and spectacular achievements as one of plastics oldest molders.

Now, more than ever, Reynolds customers are assured uninterrupted service . . . a completely dependable, permanent source for better molded plastics.

Your problems in plastics will be better served by Reynolds leadership . . . leadership that has been, and will be, among the first to develop the use of new plastic materials.

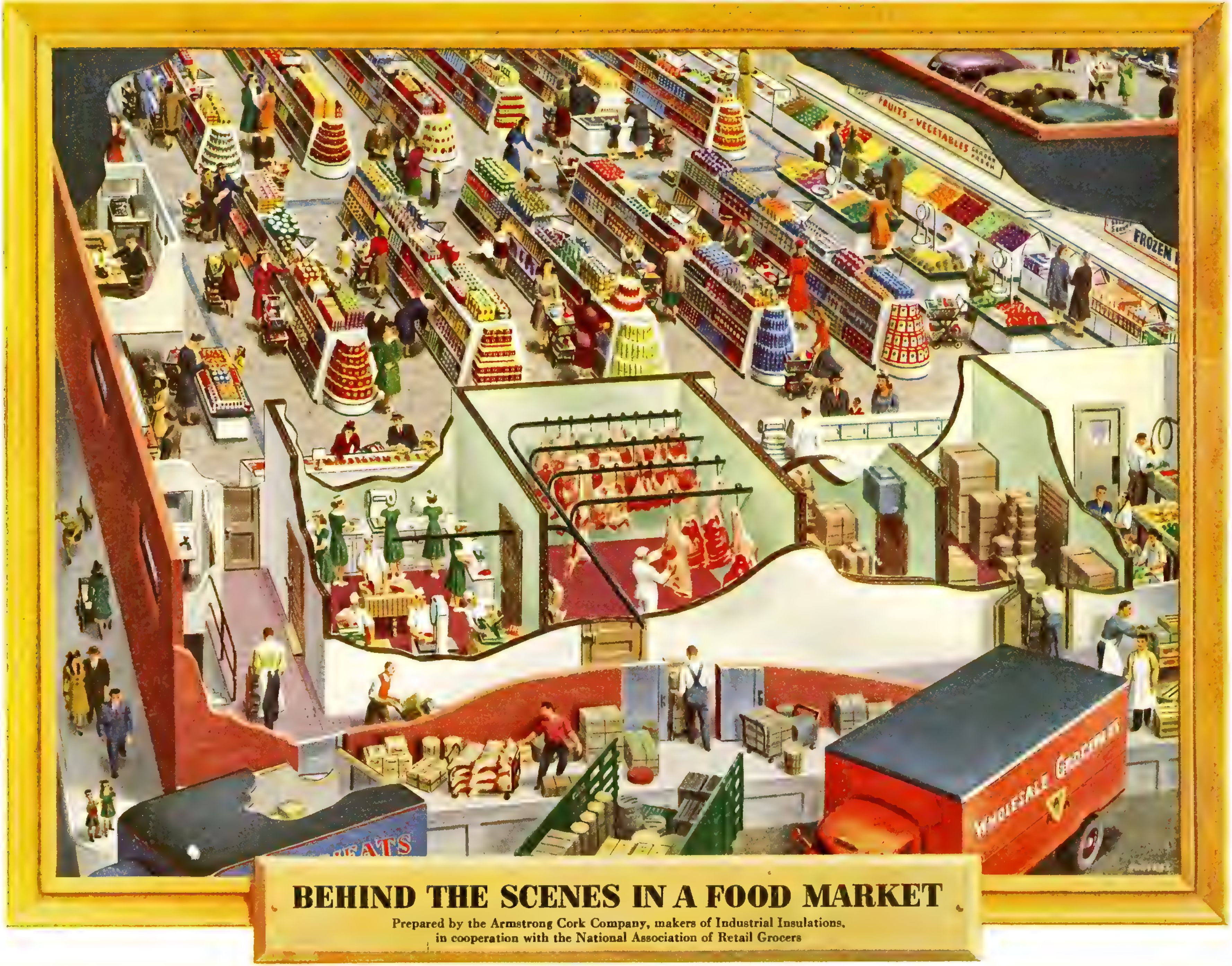
Call in a Reynolds sales engineer who will co-operate with you to work out a profitable plan that will speed both your production and sales.

REYNOLDS MOLDED PLASTICS

CAMBRIDGE, OHIO, U. S. A.

Division Reynolds Spring Company
JACKSON, MICHIGAN, U. S. A.

XR



BEHIND THE SCENES IN A FOOD MARKET

Prepared by the Armstrong Cork Company, makers of Industrial Insulations,
in cooperation with the National Association of Retail Grocers

PM XR

TELEVISED PASSENGER [illegible]

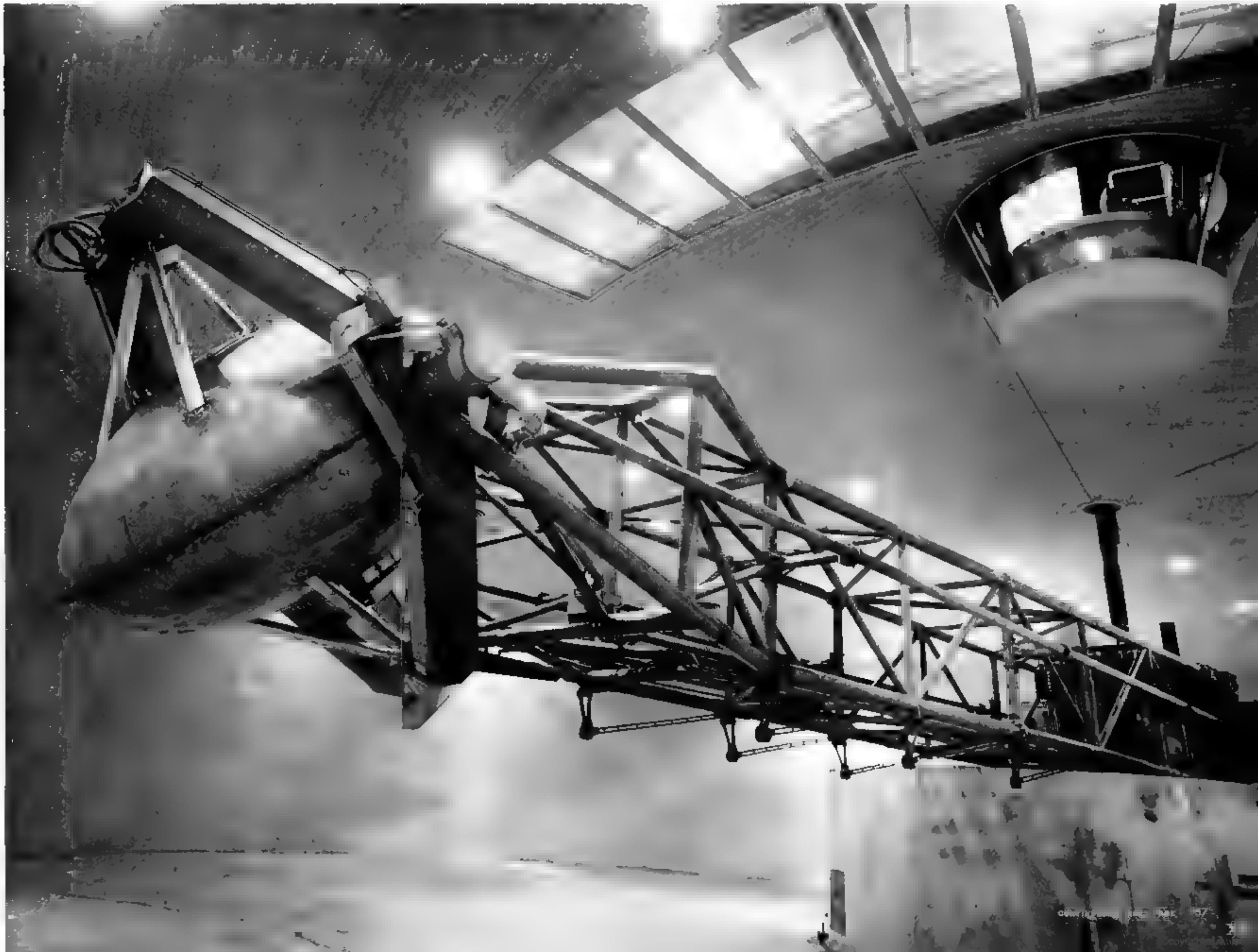
FROM CONTROL ROOM [illegible] three [illegible] can be set before a [illegible] operates automatically.

JET AGE WHIRLIGIG

Human centrifuge spins men into unconsciousness to reveal the cause and the cures of pilot blackout

Though modern aircraft are built to take the jolts of the jet age, the men who fly them are not. Pulling out of high-speed dives and turns, they black out, sometimes crashing before they recover consciousness. The huge "human centrifuge" (*below*) represents the latest attempt to find out how blackouts occur and what can be done to prevent them in today's planes and the passenger-carrying rockets of the future.

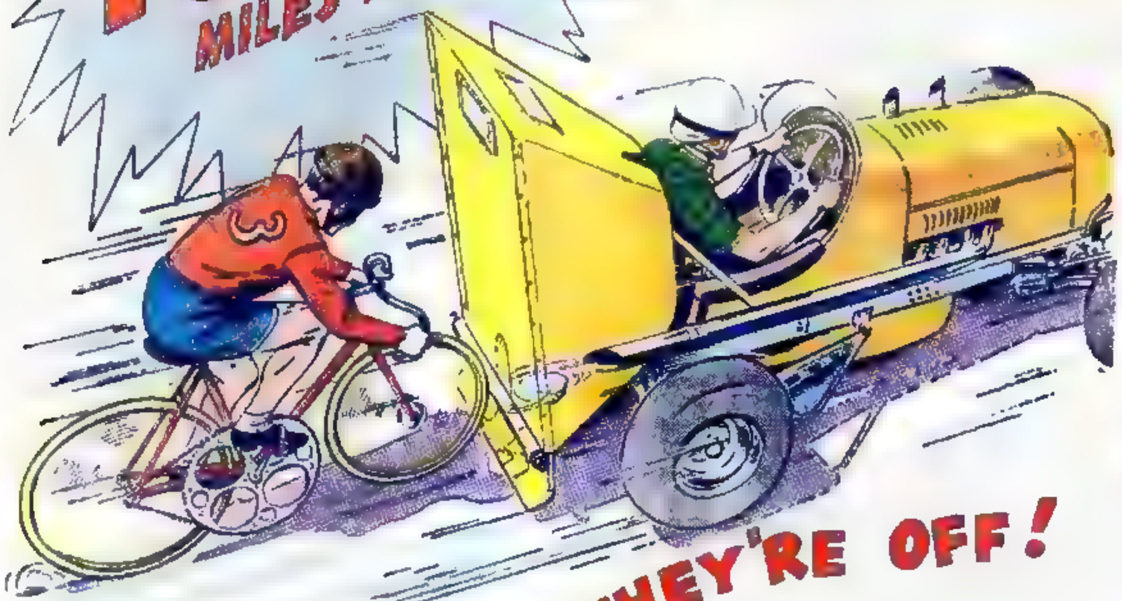
The $5 million centrifuge was recently completed at the Navy's Air Development Center near Philadelphia. Resembling a souped-up version of an amusement park's aerial ride, it consists of a 50-foot arm on the end of which is a spherical-shaped gondola where a man rides. The centrifuge's powerful motor can swing the gondola so rapidly that the centrifugal force on a passenger's body would reach 40 Gs—40 times the force of gravity and eight times the force that normally blacks out a pilot in a tight turn. To develop this force, the gondola travels in a 300-foot circle at 175 mph. The gondola contains instruments to record the passenger's pulse, brainwaves and respiration. An X-ray machine photographs his organs. And a television camera transmits to observers outside the strain registered on his face as he blacks out.



CENTRIFUGE has a giant motor (*right*) to swing arm holding gondola. At top right is control room.

108.92 MILES PER HOUR ON A BICYCLE!

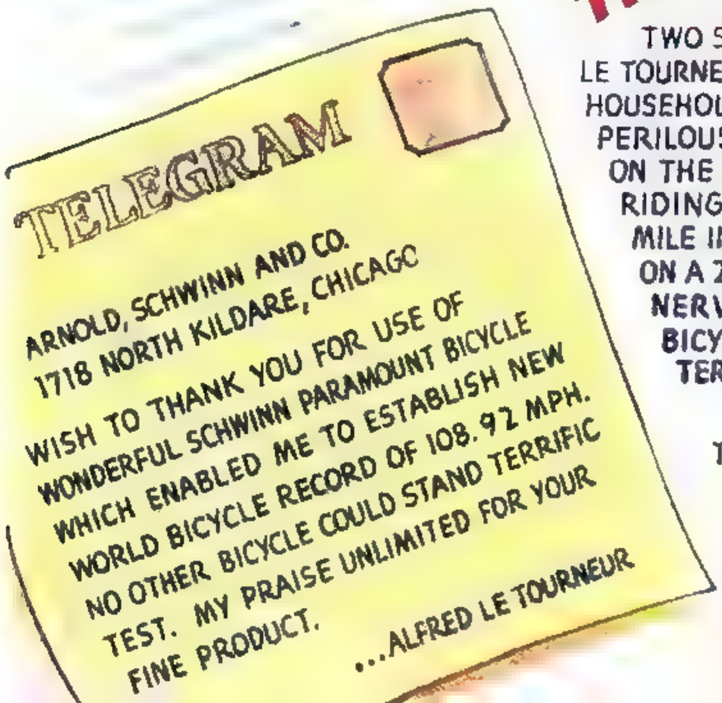
WORLDS MOTOR-PACE SPEED RECORD BY LETOURNEUR



THEY'RE OFF!

TWO SPEED DEMONS, ALFRED LE TOURNEUR, PACED BY RONNIE HOUSEHOLDER, START ON THE PERILOUS RIDE AGAINST TIME ON THE CONCRETE HIGHWAY. RIDING AT A SPEED OF ONE MILE IN THIRTY-FIVE SECONDS ON A 2% UPGRADE REQUIRES NERVES OF STEEL AND A BICYCLE ABLE TO TAKE THE TERRIFIC PACE.

THE BICYCLE THAT MADE THIS DEATH DEFYING RECORD WAS A SCHWINN PARAMOUNT RACER FITTED WITH AN OVERSIZE SPROCKET.

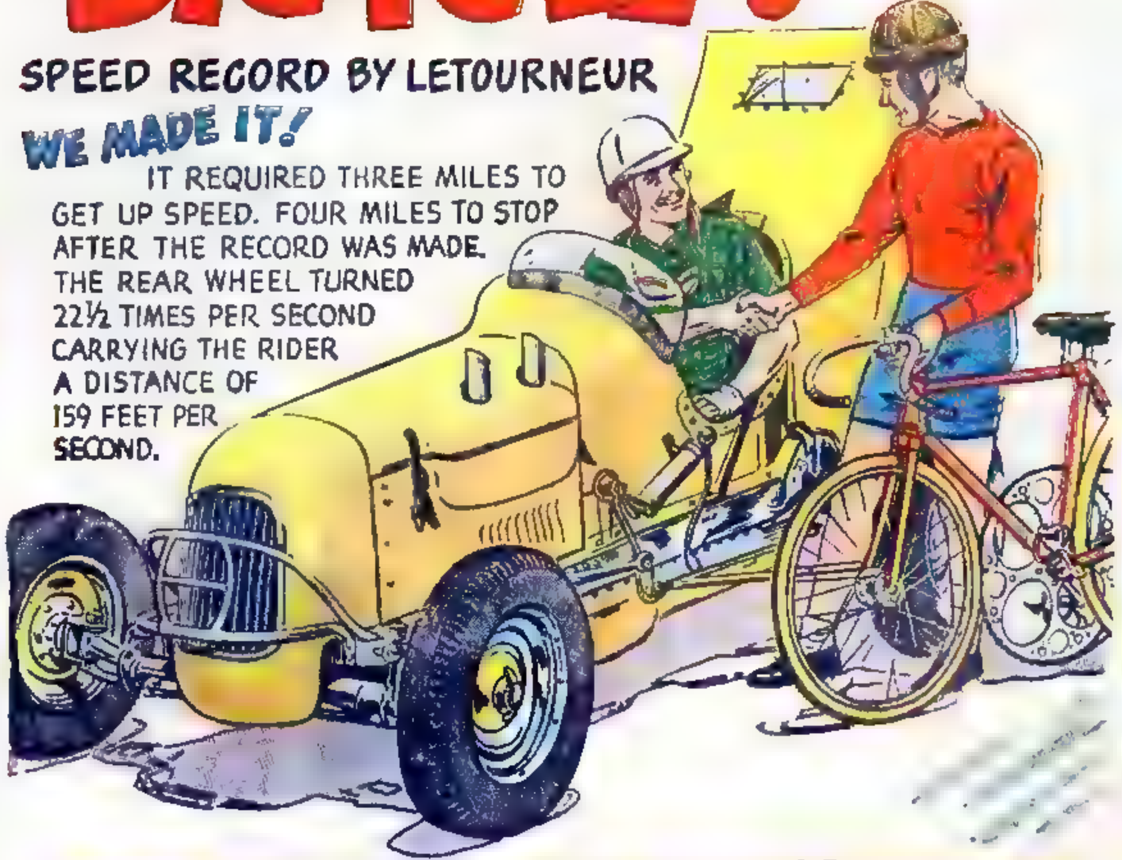


TELEGRAM

ARNOLD, SCHWINN AND CO.
1718 NORTH KILDARE, CHICAGO

WISH TO THANK YOU FOR USE OF WONDERFUL SCHWINN PARAMOUNT BICYCLE WHICH ENABLED ME TO ESTABLISH NEW WORLD BICYCLE RECORD OF 108.92 MPH. NO OTHER BICYCLE COULD STAND TERRIFIC TEST. MY PRAISE UNLIMITED FOR YOUR FINE PRODUCT.

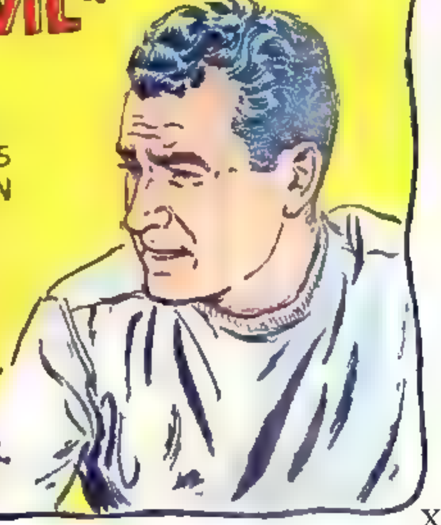
...ALFRED LE TOURNEUR



WE MADE IT!

IT REQUIRED THREE MILES TO GET UP SPEED. FOUR MILES TO STOP AFTER THE RECORD WAS MADE. THE REAR WHEEL TURNED 22½ TIMES PER SECOND CARRYING THE RIDER A DISTANCE OF 159 FEET PER SECOND.

ALFRED LETOURNEUR
"THE RED DEVIL"



ALFRED LETOURNEUR IS ONE OF THE REALLY GREAT RIDERS OF OUR TIME. LONG A FAMOUS 6-DAY RIDER, KNOWN AS THE "RED DEVIL," THIS FAMOUS FRENCHMAN HAS WON MORE 6-DAY RACES THAN ANY OF HIS COUNTRYMEN.

AFTER MAKING HIS NAME IN 6-DAY RACING, HE REACHED THE PEAK OF HIS CAREER WHEN HE RODE THE SCHWINN PARAMOUNT RACER AT THE AMAZING SPEED OF 108.92 MILES PER HOUR.

XR

THE SATURDAY EVENING

POST

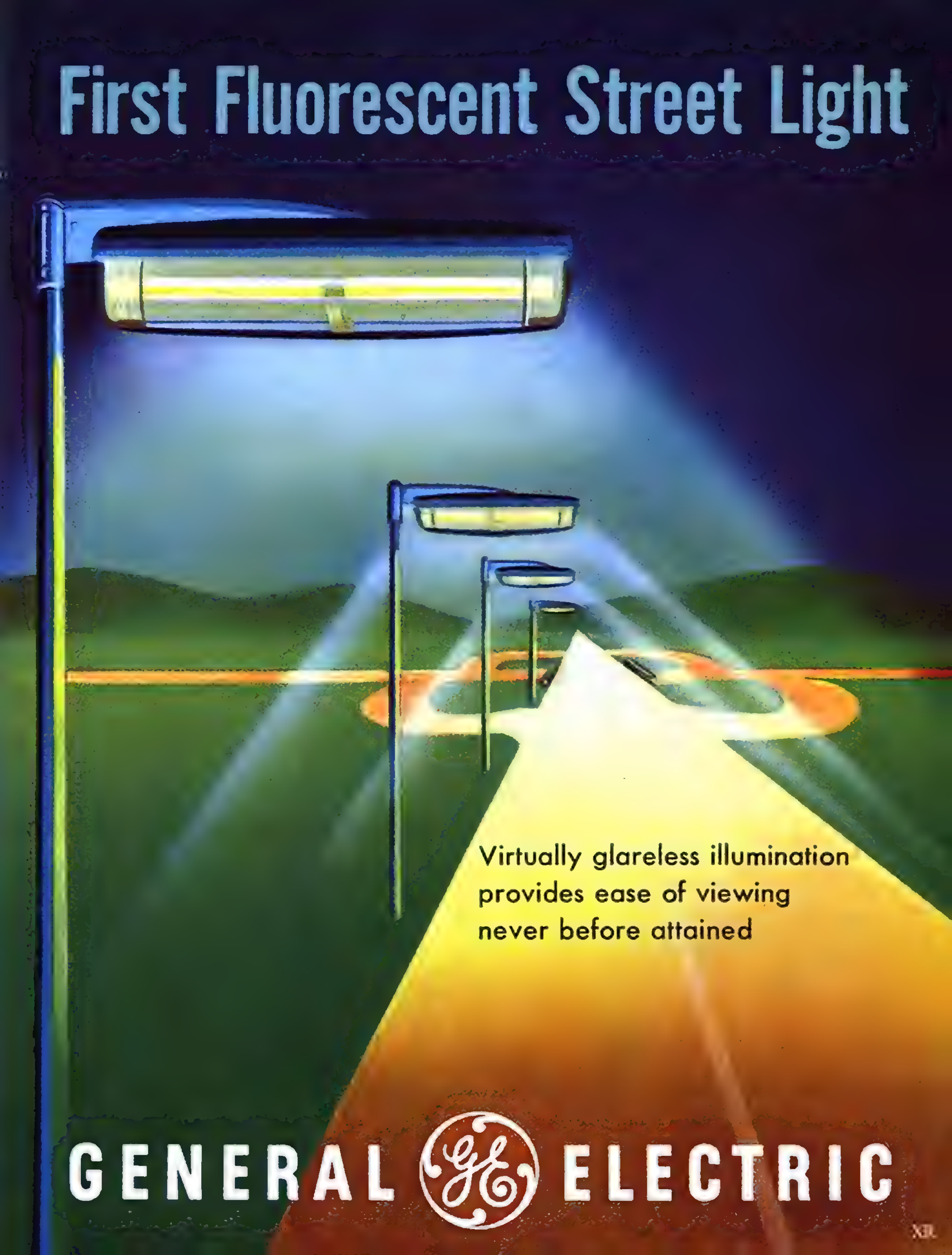
OCTOBER 4, 1947 10¢

TRUMAN'S ONE-MAN BRAIN TRUST

By Leigh White

Has Baseball Forgotten the Fan?

By Red Smith



First Fluorescent Street Light

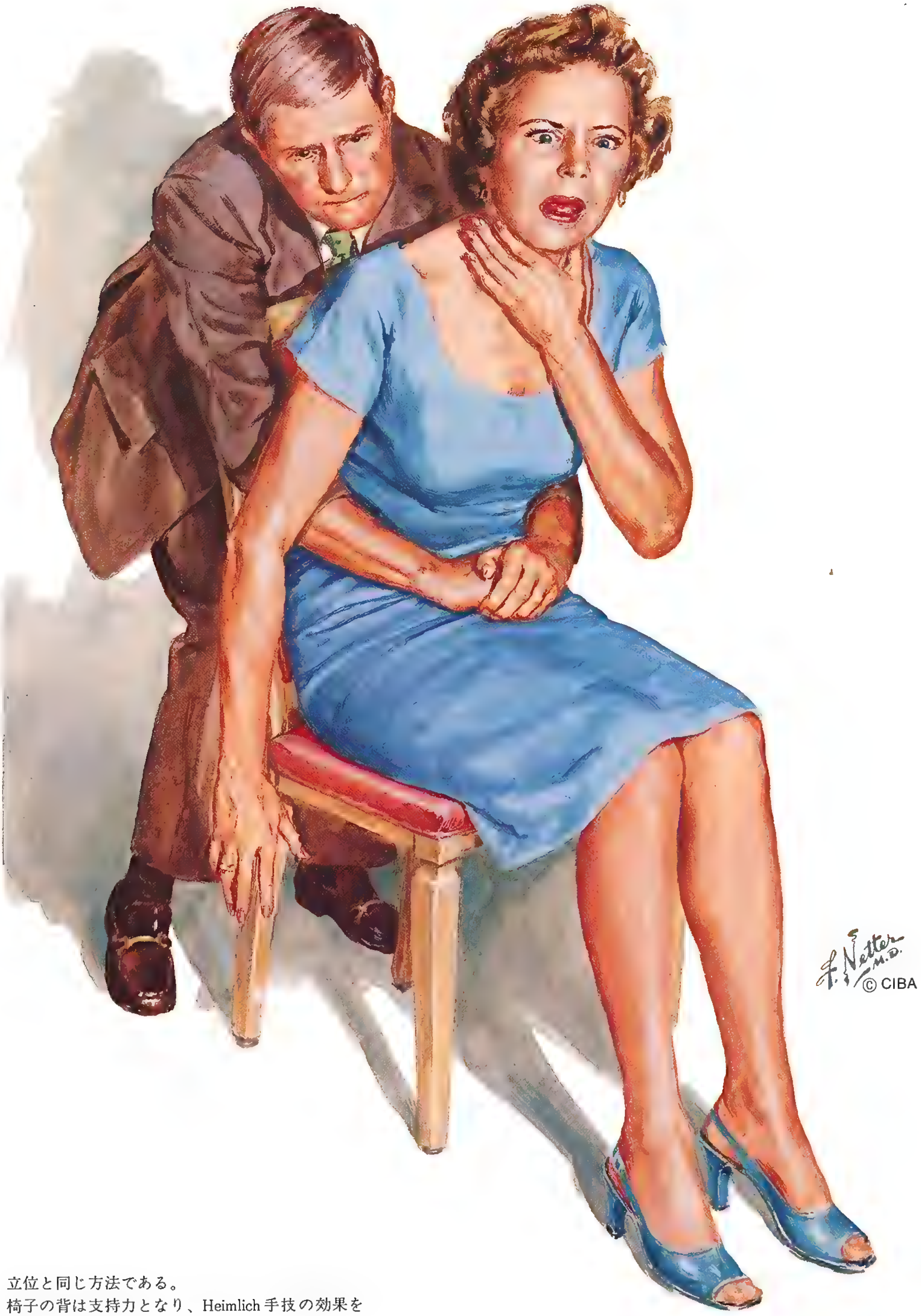
Virtually glareless illumination
provides ease of viewing
never before attained

GENERAL ELECTRIC

XB

XR

Heimlich 手技—坐位



立位と同じ方法である。
椅子の背は支持力となり、Heimlich 手技の効果を
増強させる

XR

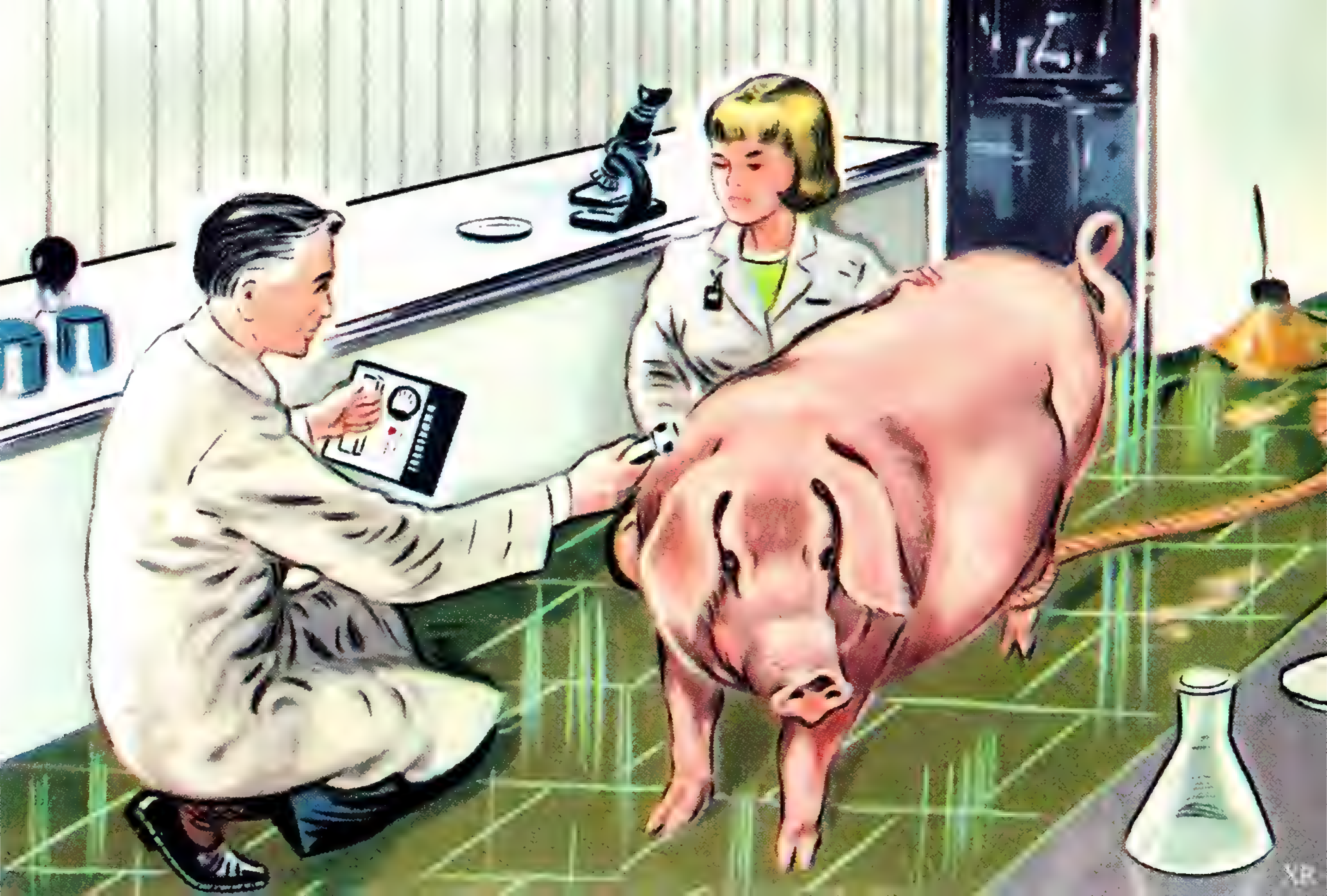
15 TONNES
XR

XR

Transportation Builds the Cities

PM XR

XR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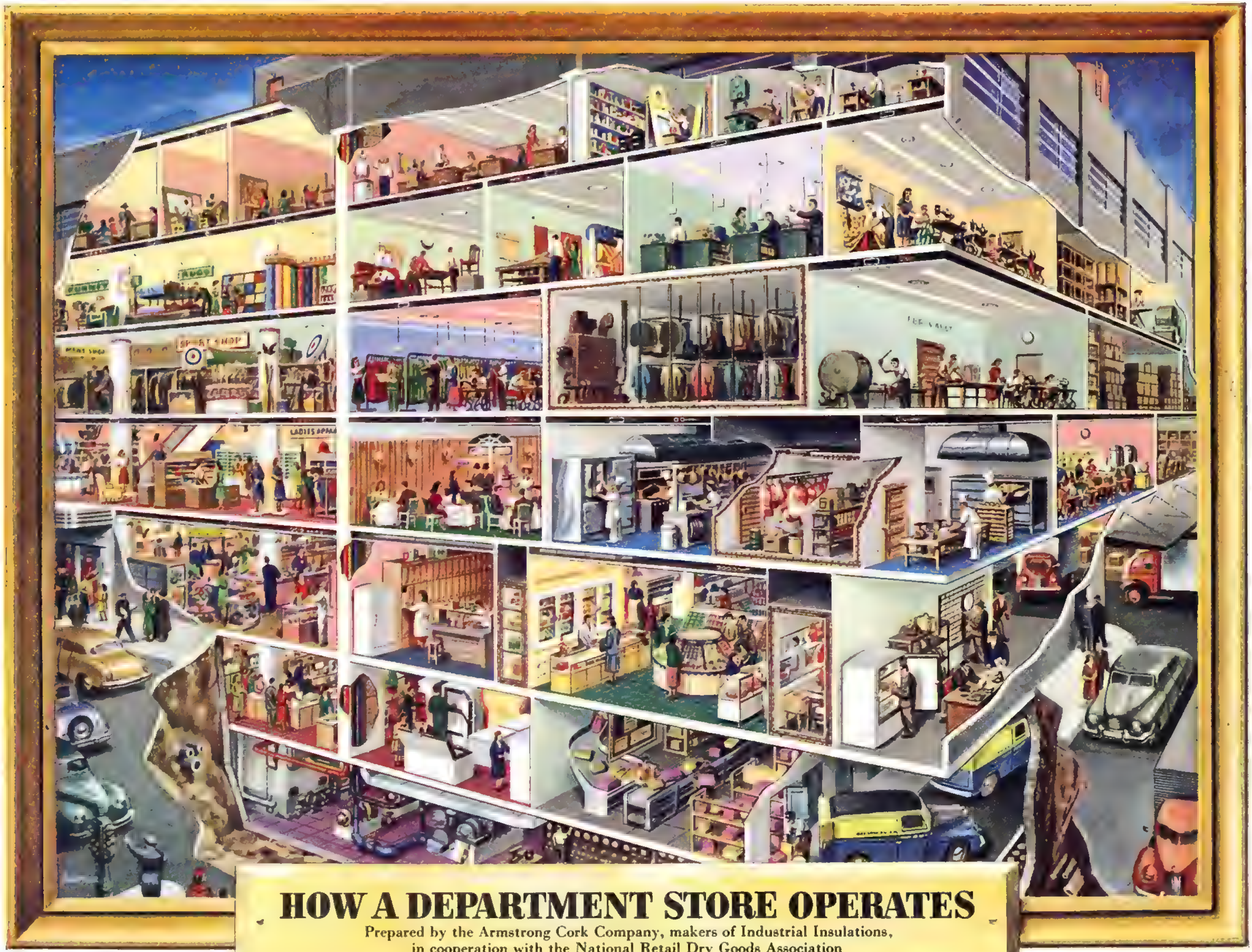
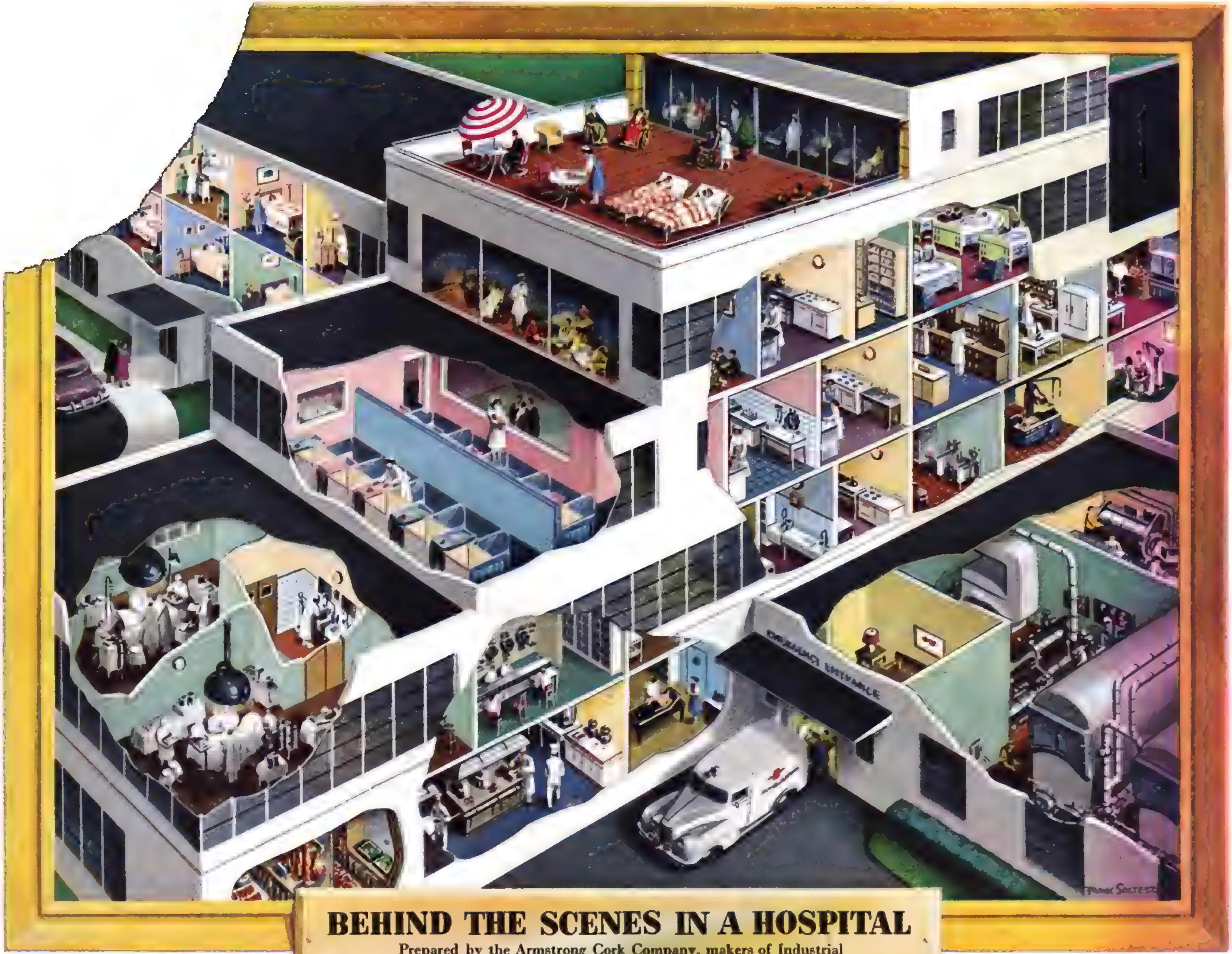


HOW A DEPARTMENT STORE OPERATES

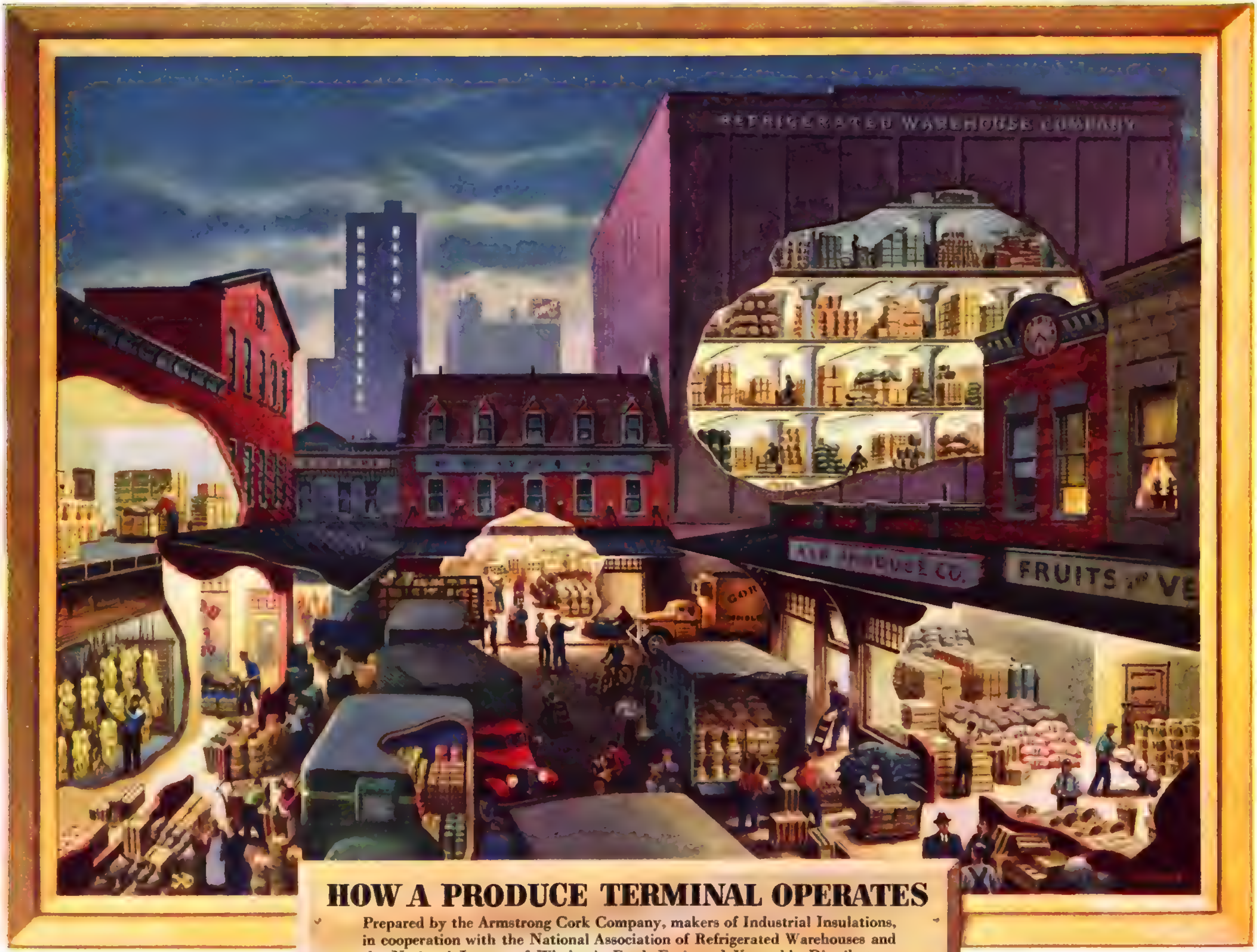
Prepared by the Armstrong Cork Company, makers of Industrial Insulations,
in cooperation with the National Retail Dry Goods Association

XR



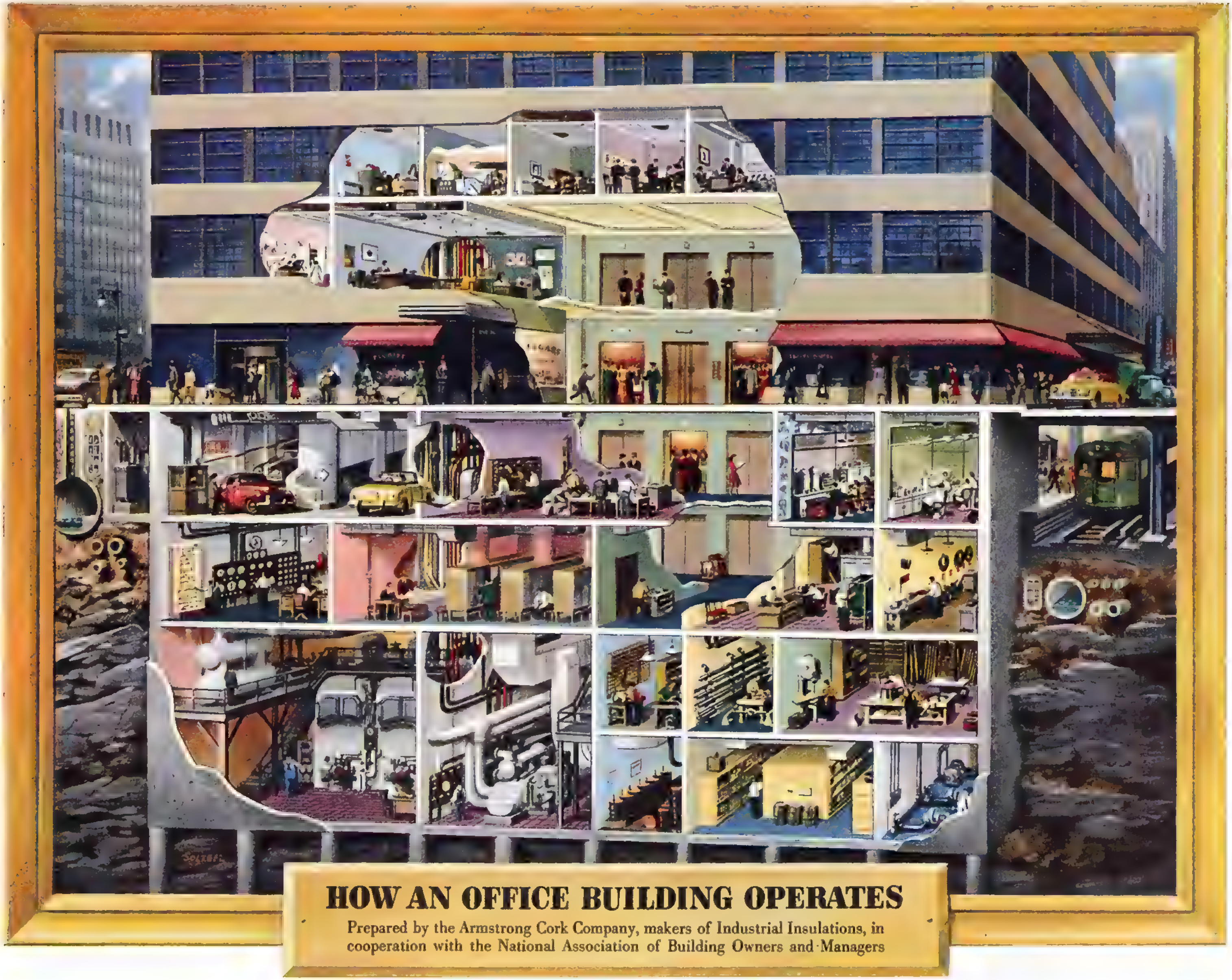
BEHIND THE SCENES IN A HOSPITAL

Prepared by the Armstrong Cork Company, makers of Industrial
Insulations, in cooperation with the American Hospital Association



HOW A PRODUCE TERMINAL OPERATES

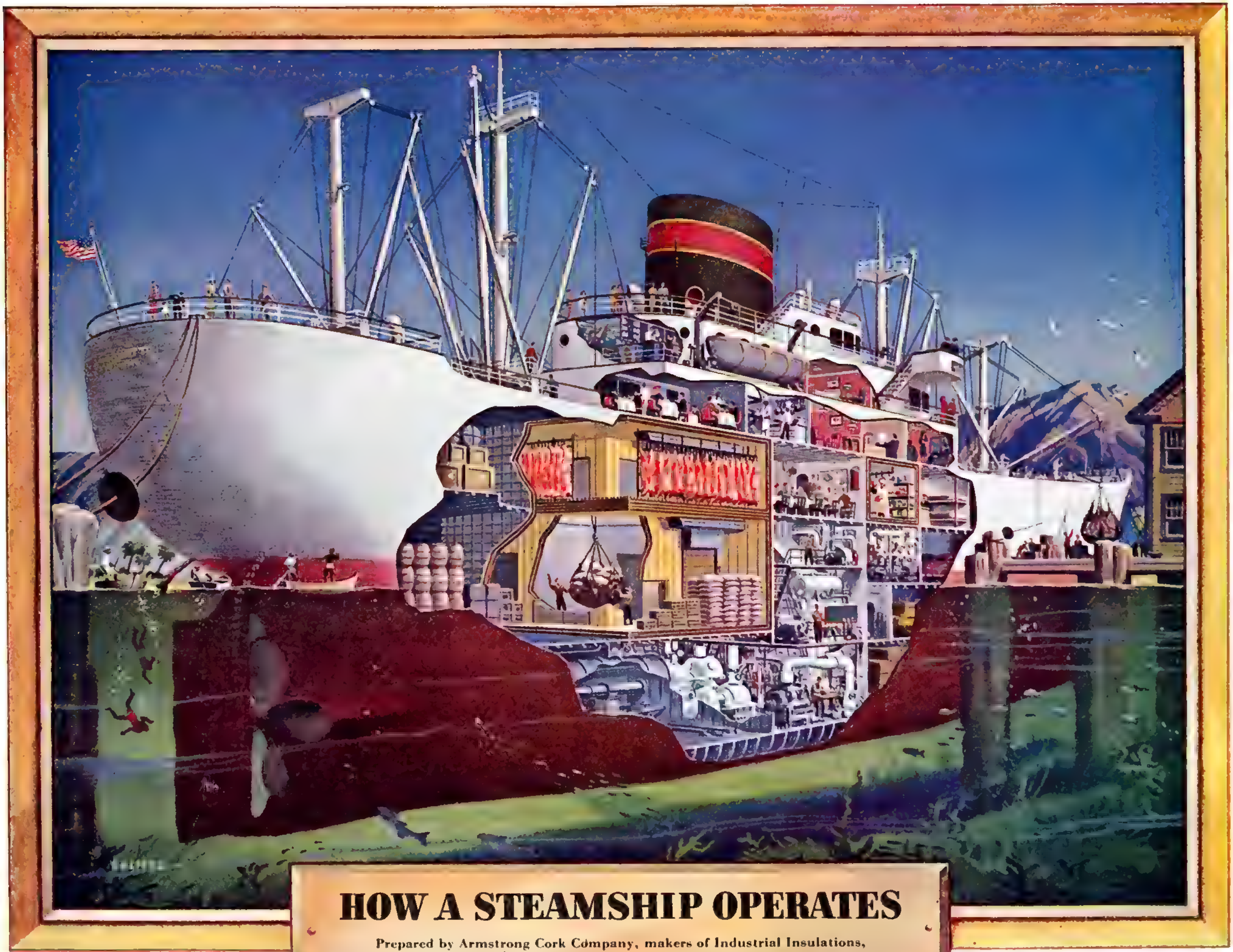
Prepared by the Armstrong Cork Company, makers of Industrial Insulations, in cooperation with the National Association of Refrigerated Warehouses and the National League of Wholesale Fresh Fruit and Vegetable Distributors.



HOW AN OFFICE BUILDING OPERATES

Prepared by the Armstrong Cork Company, makers of Industrial Insulations, in cooperation with the National Association of Building Owners and Managers

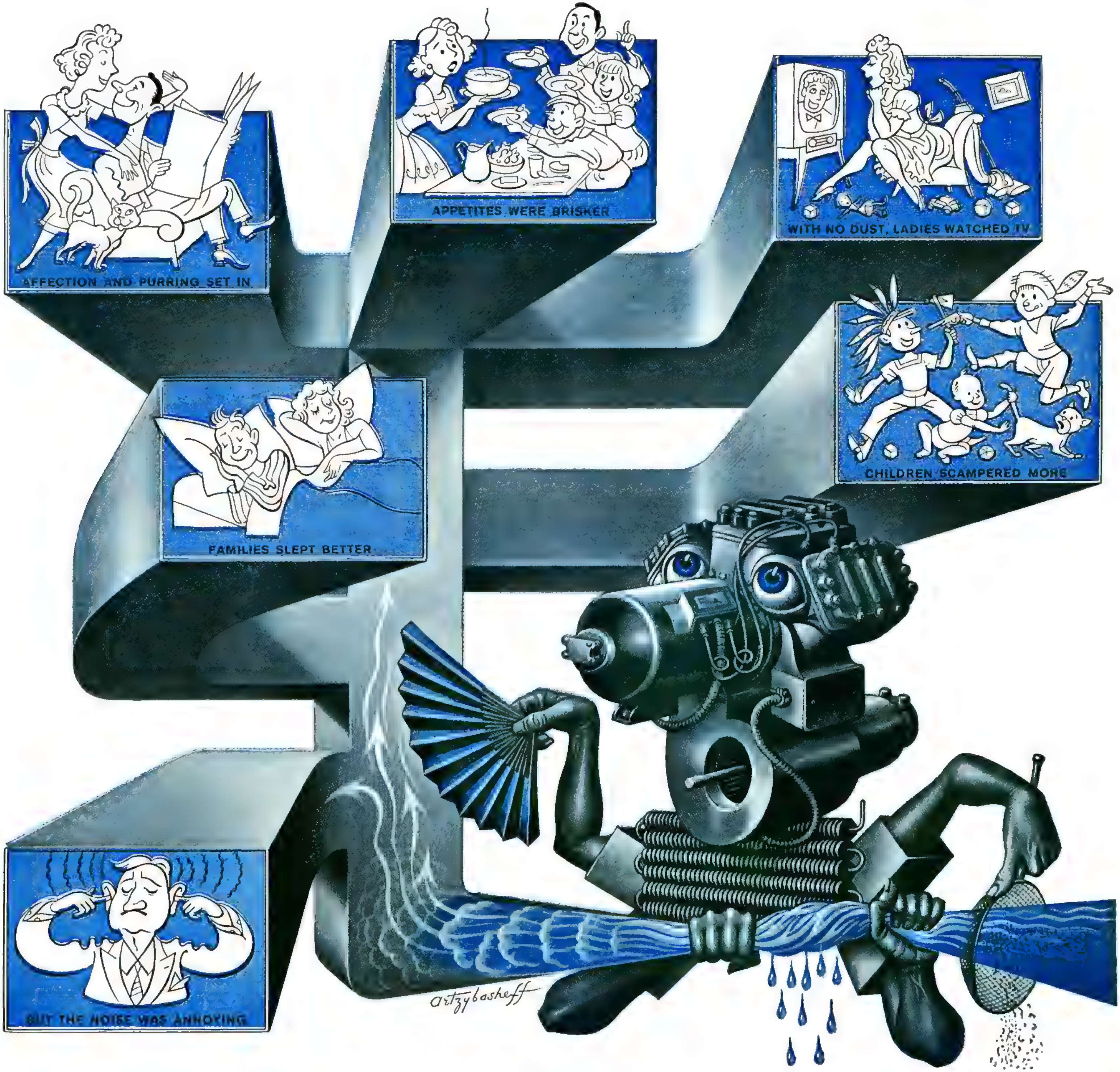
XR



HOW A STEAMSHIP OPERATES

Prepared by Armstrong Cork Company, makers of Industrial Insulations,
in cooperation with the National Federation of American Shipping

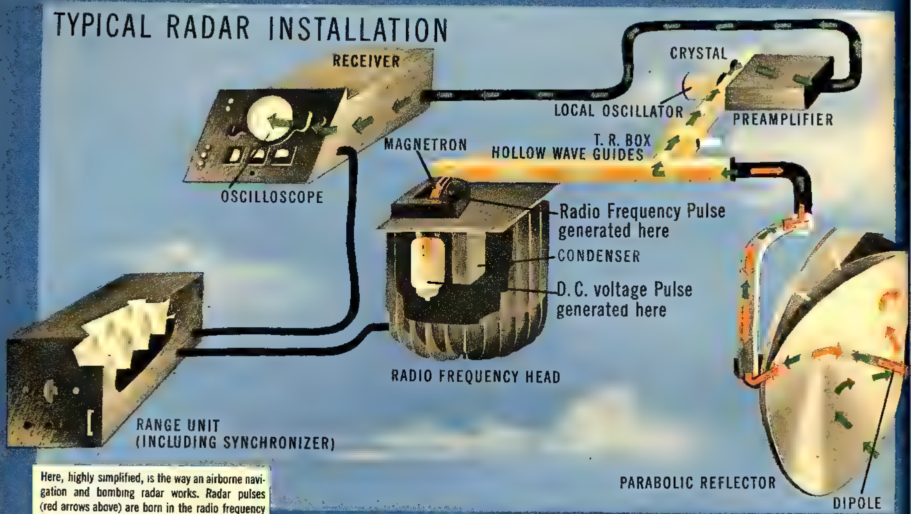
XR


AFFECTION AND PURRING SET IN
APPETITES WERE BRISKER
WITH NO DUST, LADIES WATCHED TV
CHILDREN SCAMPERED MORE
FAMILIES SLEPT BETTER
BUT THE NOISE WAS ANNOYING
artzybasheff

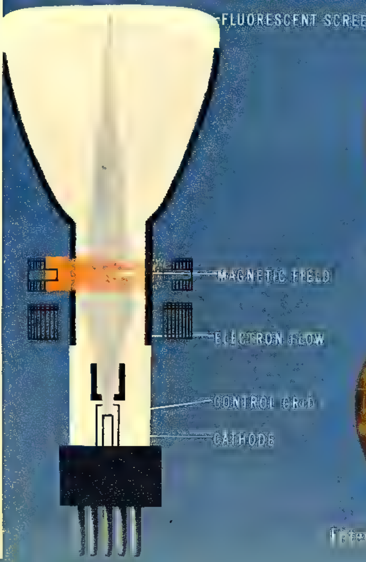
XR

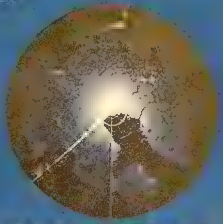
RADAR: A PRIMER

TYPICAL RADAR INSTALLATION

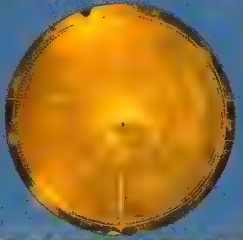


Here, highly simplified, is the way an airborne navigation and bombing radar works. Radar pulses (red arrows above) are born in the radio frequency head of the set when the split-second oscillations of an electronic tube are used to discharge a high-voltage condenser through a magnetron tube. The magnetron changes the low-frequency pulses into ultra-high-frequency pulses, which are piped through hollow wave guides to the dipole of the antenna. The pulses that leave the dipole after reflection from the dish take the form of an extremely powerful, highly concentrated beam. They are nonetheless timed so that the tiny pulse echoes (green arrows), bouncing back from a target, have time to strike the parabolic reflector of the antenna, rebound to the dipole, and flow into the receiving circuits of the set before the next magnetron pulse is released. (To prevent the outgoing pulse from damaging the receiver circuits, a transmitter-receiver box provides insulation.) The faint incoming pulses are detected by a crystal which mixes them with ultra-high-frequency pulses from a local oscillator. The lower frequency that results is amplified, then fed onto the control grid of the cathode-ray screen of the oscilloscope (detailed at right) through which an electronic current is flowing. This electron flow paints on the fluorescent tube face a faint, steady spot of light, which is made to travel back and forth by switching on and off an electromagnet at the rim. The lingering streak of light that results is caused to swing completely around the tube face by means of another magnet rotating around the neck of the tube. By a geared mechanism in the range unit, the rotations of this magnet are synchronized with the rotations of the antenna of the set as it scans. Thus an echo from a target appears as a blob of light on the scope at a point corresponding to the point in space where the target lies. By means of range data supplied to the oscilloscope by the range unit, the point can be read in terms of its position.



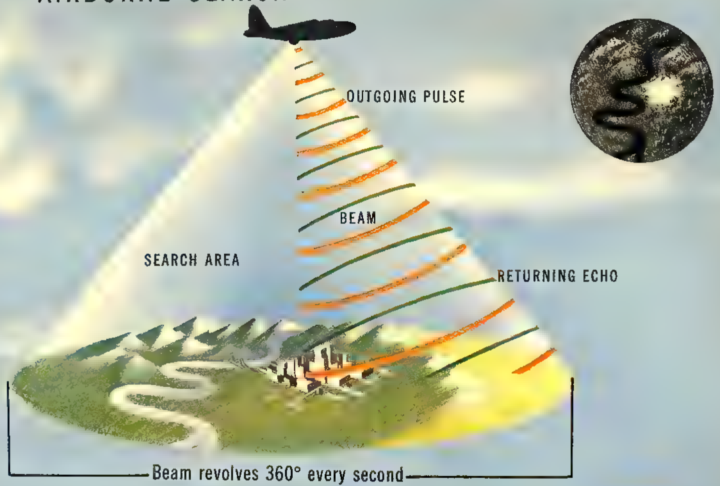


Kodachrome of P.P.I. scope

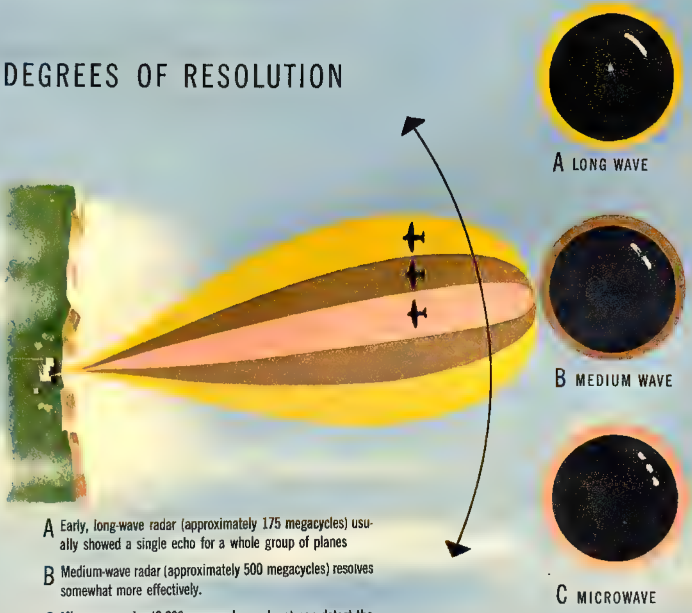


Filter on scope accents range markings

AIRBORNE SEARCH



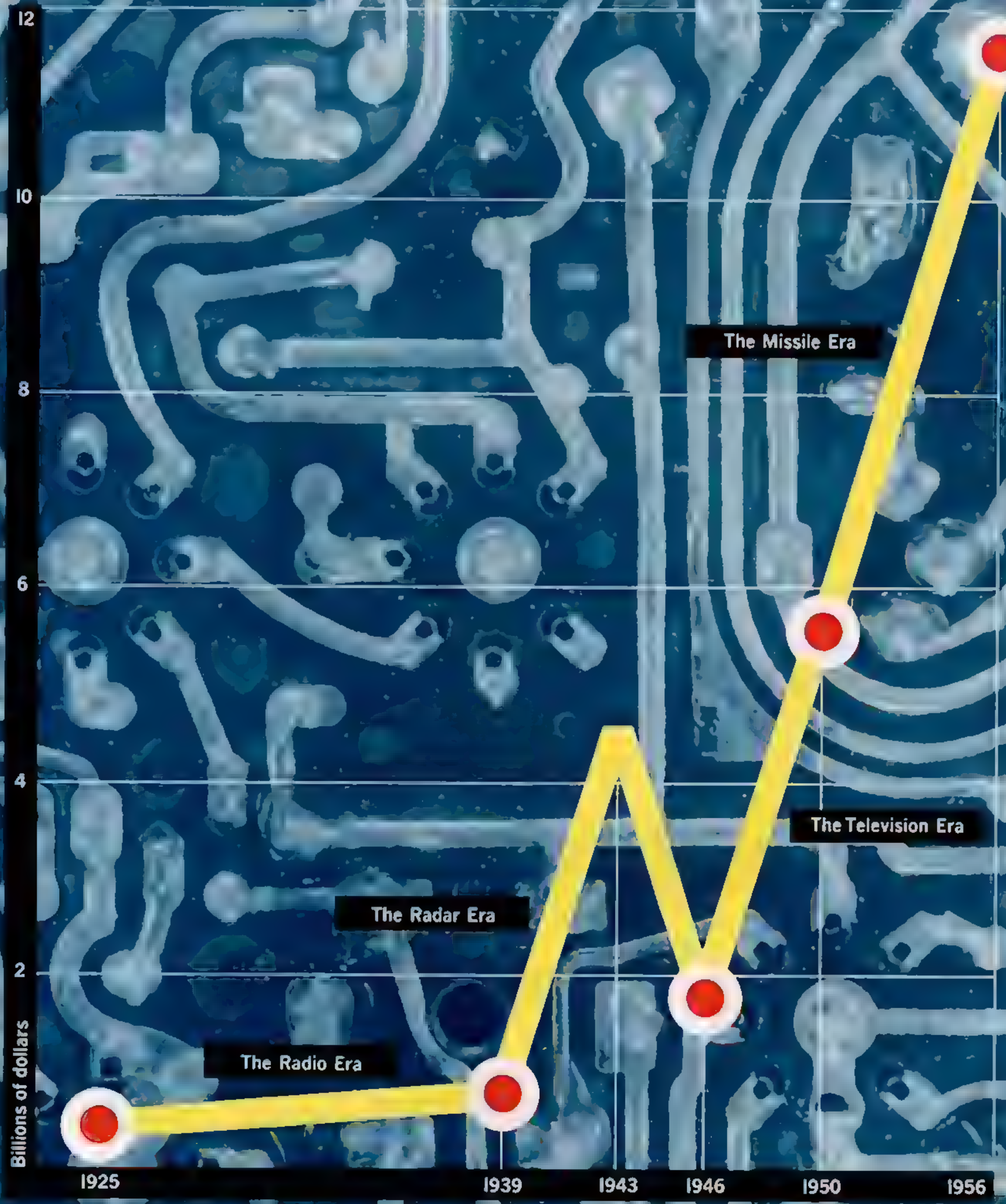
DEGREES OF RESOLUTION



A Early, long-wave radar (approximately 175 megacycles) usually showed a single echo for a whole group of planes

B Medium-wave radar (approximately 500 megacycles) resolves somewhat more effectively.

C Microwave radar (3,000 megacycles and up) can detect the individual planes of a group.


12
10
8
6
4
2
Billions of dollars
1925
1939
1943
1946
1950
1956
The Radio Era
The Radar Era
The Television Era
The Missile Era

LITTLE GRANULES OF GREAT VALUE

ONE REASON Ethocel, a recent Dow development, is so much in the public eye is its adaptability to a great variety of products.

Ethocel, the trade name of Dow Ethyl Cellulose, is a colorless, odorless, tasteless, nontoxic member of the cellulose family. It has already demonstrated its right to exceptional distinction.

Ethocel is the only cellulose derivative possessing both stability to heat and solubility in a wide range of low-cost solvents. It is bringing new qualities to fast-drying varnishes and lacquers; adding lustre and toughness to paper coatings; providing protective finish to textiles. Makers of wire insulation welcome its flexibility and dielectric properties.

Still other qualities that recommend Ethocel to designers and manufacturers of moulded products are dimensional stability, resistance to dilute acids and alkalies, low flammability and high resistance to sunlight and humidity. Ethocel film and sheet provide special advantages for packaging and other purposes.

And so in the little white granules of Ethocel you find a material of truly amazing versatility, as well as manifold virtues. Probably no other product among the more than three hundred Dow developments so greatly stimulates the imagination or makes a more useful contribution to industry.

DOW

CHEMICALS INDISPENSABLE
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XR

Millions steer with TENITE

TENITE STEERING WHEELS are now in the hands of millions of automobile drivers. These plastic wheels—molded over a metal core—have the horn-like toughness and beauty of Tenite combined with the rigidity of metal.

Lustrous color—warmth to the touch—a smooth dirt-resistant surface—and a total absence of exudation that soils hands or gloves—these are the qualities of Tenite which have made it the most widely used plastic for car interior appointments.

In scores of industries, large and small, products are now being molded of Tenite more economically than they could be cast or machined of any other comparable material. High-speed production, reduced finishing operations, added beauty and serviceability are advantages of Tenite which contribute to profitable sales.

Tenite Book on Request

Tenite is a tough, practically unbreakable plastic made of Eastman cellulose esters in an unlimited range of transparent and opaque colors. Leading custom molders will tell you more about its advantages—or write us direct for a 52-page book on Tenite and its uses. Tennessee Eastman Corporation (Subsidiary of the Eastman Kodak Company), Kingsport, Tennessee.

TENITE AN EASTMAN PLASTIC

Plastics Will Mean Better Homes

... *and more of them!*

Even today, plastics men can vision a bathroom with practically everything in it made of plastics or containing plastics in some form. Imagine such a bathroom, costing less to manufacture, to ship, and to install, delivered *as a unit* to your home!

The raw materials to make better homes with more bathrooms and finer kitchens come true are *in existence today* ... in Vinylite and Bakelite resins, and plastics made from them.

Bakelite resin-bonded plywood, like that from which planes and torpedo boats are made, can be used to make floors, walls, ceilings, and furniture.

The type of plastic film used in waterproof, chemical-resistant food bags and rifle covers can be fabricated into mildew-proof shower curtains. Vinylite resins can also be made into rot-resistant floor coverings that can be walked on millions of times *without showing appreciable wear!*

Our engineers know from the record of Vinylite plastic-coated life raft sails, sleeping bags, and life preservers, that Vinylite plastics and compounds can be used in the future to bring you wall coverings, window curtains, and furniture finishes that will outlast anything now available.

Under heat and pressure, Vinylite and Bakelite plastics can be molded into numberless useful forms. Experience gained in molding war equipment will help to bring you such things as molded plastic furniture which will be lighter, easier to move, easier to keep clean!

Spun plastics made from vinyl resins are resistant to rot. Right now, such plastics are used for making jungle hammock ropes and vital chemical filters. They also can be fashioned into draperies, upholstery, stockings, and other articles of clothing ... sunproof, waterproof, and mothproof!

Vinylite and Bakelite resins and plastics, and many new techniques for using them, are peacetime research achievements of Carbide and Carbon Chemicals Corporation and Bakelite Corporation, both Units of UCC. Fabricators converting these raw materials into finished articles are making them mean more and more to you.

BUY UNITED STATES WAR BONDS AND STAMPS

GREATER SAFETY! Improved electrical wiring insulation that *will not support flame* can be made from several Vinylite plastic compounds. Such wiring, now employed in vital circuits of warships, will some day provide greater safety in the home.

MORE BEAUTY! New *washable* water paints, based on Bakelite resins, will bring new beauty to homes. These paints are inexpensive ... and easy *to apply!*

LESS EXPENSE! Use of Bakelite molding plastics in making washing machines, refrigerators, and many other household devices and fixtures can mean lower-priced, longer-lasting equipment for you.

LESS WORK! Easier cleaning of plastic-treated walls, ceilings, and floors. Plastic furniture and upholstery that are easier to keep clean. Yours in the future!

UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street UCC New York 17, N. Y.

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Haynes Stellite Company
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ELECTRODES, CARBONS AND BATTERIES
National Carbon Company, Inc.

INDUSTRIAL GASES AND CARBIDE
The Linde Air Products Company
The Oxweld Railroad Service Company
The Prest-O-Lite Company, Inc.

PLASTICS
Bakelite Corporation
Plastics Division of Carbide and Carbon Chemicals Corporation

XR

A Whisper
that Echoed Round the World

From the Bronx to Bali . . . from Ft. Worth to Foochow you will find the products of a dozen great industries walking on tip-toe as proof of the fact that Silence-by-Inland pays dividends at the box office.

It all started with the quiet wedding of metal and rubber into an enduring union. Inland accomplished it, first, for Motordom's decibel-conscious engineers who well knew that Americans on the move demanded the right to whisper to their motoring companions.

The news about this eminently successful whispering campaign soon echoed round the world of industry, until today, Inland makes some 425 products which cushion shock, insulate against the transmission of sound and smooth out vibration.

Today, Airplanes, Escalators and Streamlined Trains; Automobiles and Tractors; Automatic Refrigerators and Coffee Grinders; Washing Machines and Vacuum Cleaners; Diesel Engines and Outboard Motors—all wear cloaks of Inland-made-quiet.

Today, Inland's chemical and mechanical research engineers continue to make countless contributions to industry—pioneering the development of new compounds, new designs, new formulas, methods and tools.

And today, Inland merges decibels and decimals for economical, large-volume production of rubber, metal and plastics.

It has not taken long for the engineers of America's greatest industries to hear the whisper that circled the globe. Perhaps you'd like to hear all about this so that your customers will hear less—and buy more.

INLAND *Manufacturing Division,* **GENERAL MOTORS CORPORATION**
DAYTON, OHIO RAHWAY, N. J.

IF YOU HAVE A PROBLEM PRODUCT, REMEMBER
INLAND WILL MAKE IT
STYLISH
QUIET, SAFE and
SHOCK INSULATED
with Rubber, Metal and Plastics
INLAND

ALL ABOUT
ENGINES AND POWER

by **SAM** and **BERYL EPSTEIN** • illustrated by JOSEPH and EVA CELLINI

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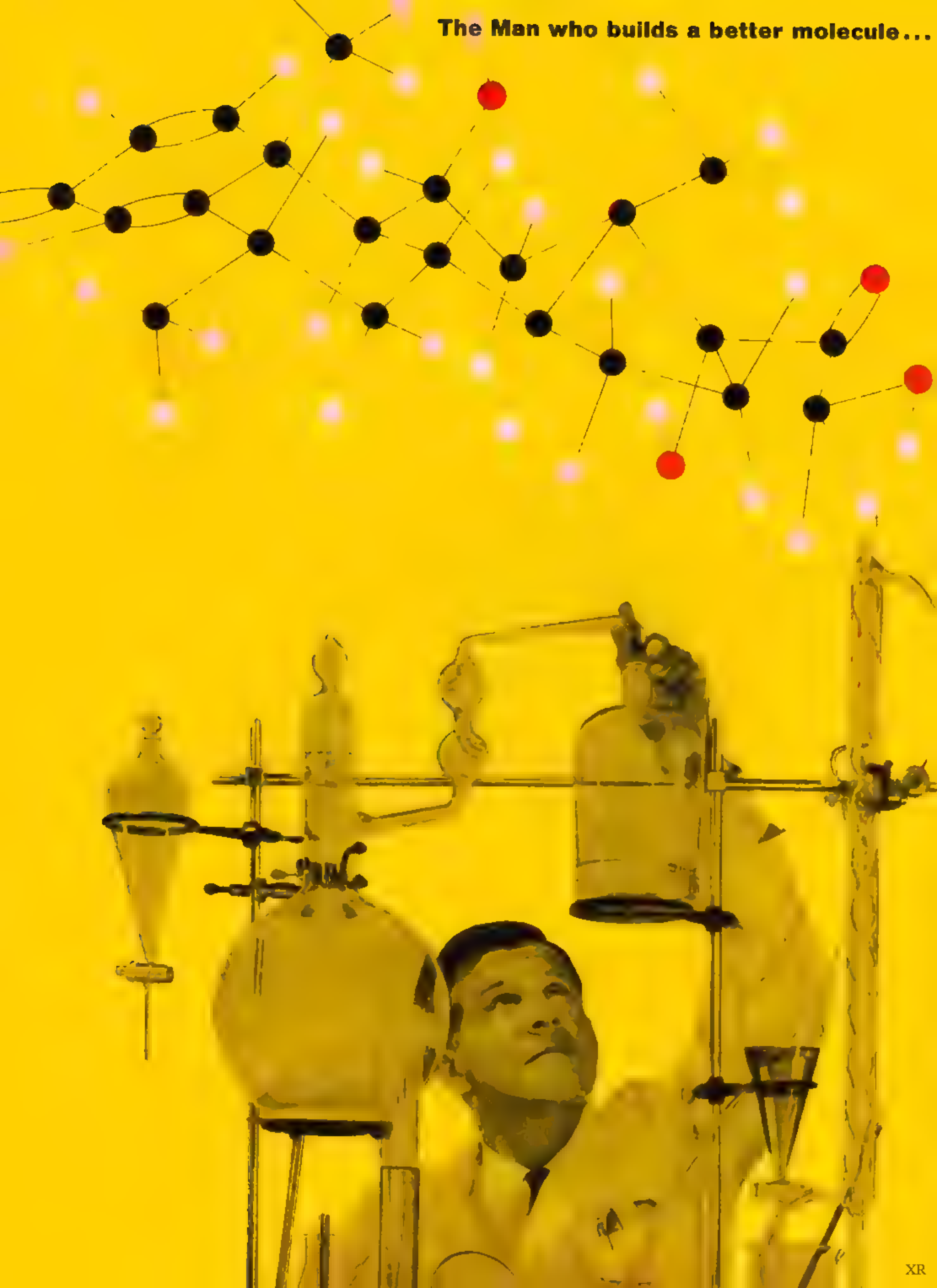
The Man who builds a better molecule...
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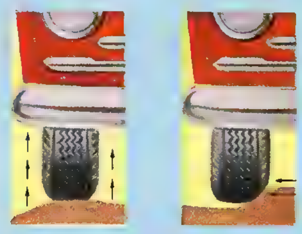
LEADING AUTO MAKERS SWITCH TO NEW KIND OF TIRE!



Auto makers have done wonders to cushion cars against up-and-down shocks (left). But till Goodyear produced Super-Cushions, lateral (crosswise) shock had never been satisfactorily absorbed.

Auto Engineers say Super-Cushion by Goodyear greatest tire advance in 15 years

Bigger, softer tire runs on only 24 pounds of air

TODAY, many 1948 cars are equipped with a new *kind* of tire. Auto engineers who tested this new tire . . . the *Super-Cushion* . . . said: "We want it for our cars . . . *now!*" Here's why:

First tire to lick lateral shock

Until Goodyear produced the *Super-Cushion*, lateral shock was one of the few things yet to be licked in the modern car. *Super-Cushions* soak up these crosswise shocks. This means a sensationally new luxury ride . . . far less fatigue . . . less wear and tear on your car.

Easier, safer car handling

The *Super-Cushion* is a *bigger, softer* tire. It holds *more* air but runs on *only 24 pounds* of air pressure instead of the usual 28 to 32. It gives an unbelievably *smoother ride*. Your car hugs the road better. You get safer steering, easier handling . . . especially on curves.

You get more mileage

Super-Cushions are softer, resist cuts and bruises, *have extra blowout resistance*. They run cooler, *give greater mileage than the finest standard tires.*

Super-Cushions on your car

Your 1948 car may have *Super-Cushions*. If you have yet to order your new car . . . insist on *Super-Cushions* . . . and get a new *kind* of tire for a new *kind* of ride.

The new Super-Cushion by GOODYEAR

XR

LET'S LOOK AHEAD!

Great developments are just ahead for the more extensive use of aluminum and magnesium alloys throughout all industry. Applications developed in the course of our production for war have shown that great economy in weight is possible through use of these alloys. Reduction in weight usually means reduction in operating costs, and in every phase of transportation this is a consideration of first importance. The Bohn organization is one of the country's most important sources for aluminum and magnesium alloys. Bohn specialists will be glad to consult with you on the advantages of these light alloys.

BOHN ALUMINUM AND BRASS CORPORATION
GENERAL OFFICES—LAFAYETTE BUILDING • DETROIT 26, MICHIGAN
Designers and Fabricators
ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

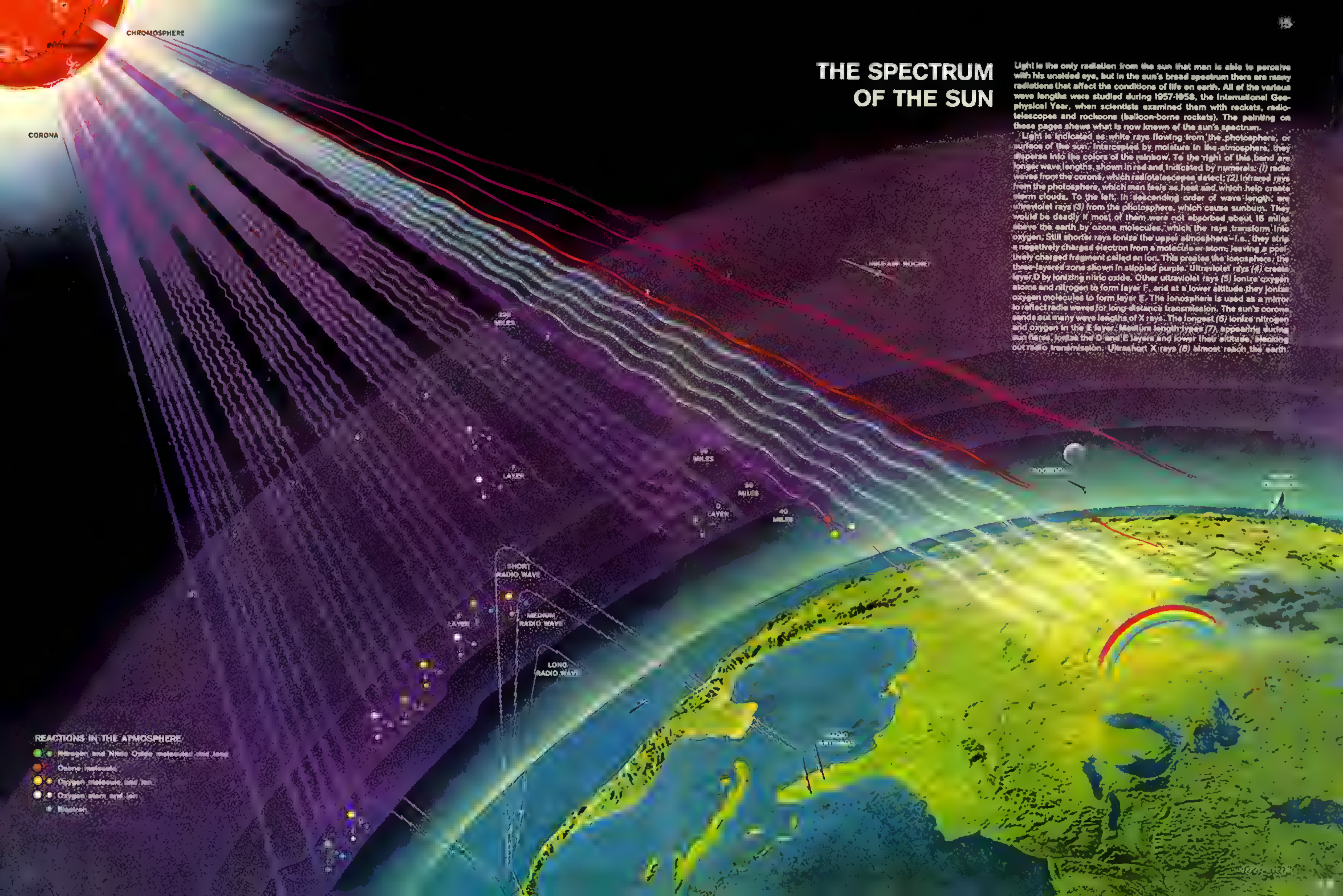
BUY WAR BONDS

BOHN

THE SPECTRUM OF THE SUN

Light is the only radiation from the sun that man is able to perceive with his unaided eye, but in the sun's broad spectrum there are many radiations that affect the conditions of life on earth. All of the various wave lengths were studied during 1957-1958, the International Geophysical Year, when scientists examined them with rockets, radiotelescopes and rockoons (balloon-borne rockets). The painting on these pages shows what is now known of the sun's spectrum.

Light is indicated as white rays flowing from the photosphere, or surface of the sun. Intercepted by moisture in the atmosphere, they disperse into the colors of the rainbow. To the right of this band are longer wave lengths, shown in red and indicated by numerals: *(1)* radio waves from the corona, which radiotelescopes detect; *(2)* infrared rays from the photosphere, which man feels as heat and which help create storm clouds. To the left, in descending order of wave length, are ultraviolet rays *(3)* from the photosphere, which cause sunburn. They would be deadly if most of them were not absorbed about 15 miles above the earth by ozone molecules, which the rays transform into oxygen. Still shorter rays ionize the upper atmosphere—*i.e.*, they strip a negatively charged electron from a molecule or atom, leaving a positively charged fragment called an ion. This creates the ionosphere, the three-layered zone shown in stippled purple. Ultraviolet rays *(4)* create layer D by ionizing nitric oxide. Other ultraviolet rays *(5)* ionize oxygen atoms and nitrogen to form layer F, and at a lower altitude they ionize oxygen molecules to form layer E. The ionosphere is used as a mirror to reflect radio waves for long-distance transmission. The sun's corona sends out many wave lengths of X rays. The longest *(6)* ionize nitrogen and oxygen in the E layer. Medium length types *(7)*, appearing during sun flares, ionize the D and E layers and lower their altitude, blocking out radio transmission. Ultrashort X rays *(8)* almost reach the earth.



Men Who Plan beyond Tomorrow Like the Lightness of Seagram's V.O.

FOR A HEALTHIER AMERICA!

Architects are planning Health Centers, set alongside colony apartment buildings. Tall glass towers equipped for light and heat therapy, group exercises, massage and medical care . . . Tennis and badminton courts, skating rinks, swimming and wading pools — under roll-back glass roofs. Part of the trend away from congestion in cities, part of the progress toward more spacious, happy living conditions.

★ ★ ★

SEAGRAM was planning for the future six long years ago . . . the year that saw the "race of the century" when Seabiscuit outran War Admiral. That same year, Ireland elected her first president, Hitler dismembered Czecho-Slovakia, and the *youngest* of the rare whiskies in your Seagram's V.O. CANADIAN was carefully laid away to mellow! So that today you could have Seagram's V.O. — CANADIAN WHISKY AT ITS GLORIOUS BEST.

Seagram's V.O. CANADIAN

CANADIAN WHISKY • A BLEND OF RARE SELECTED WHISKIES

Six Years Old—86.8 Proof. Seagram-Distillers Corporation, New York

XR

Announcing

The Greatest LIFE Science Series

THE WORLD WE LIVE IN

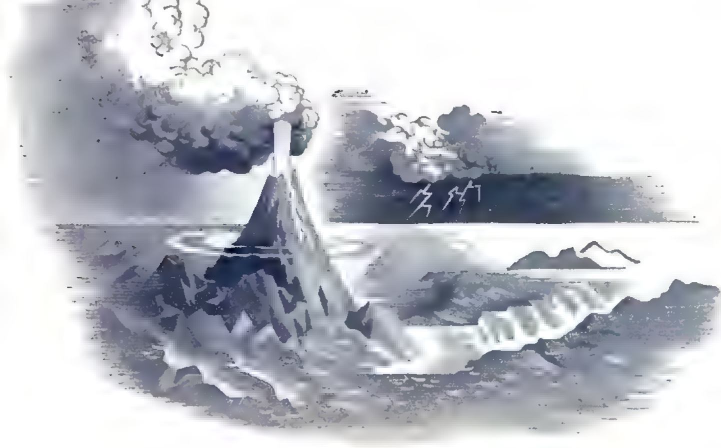
> *"Prisoned in his paved cities, blindfolded by his impulses and necessities, man tends to disregard the system of nature in which he stands. It is only at infrequent moments when he finds himself beneath the stars, at sea perhaps, or in a moonlit meadow or on a foreign shore, that he contemplates the natural world—and wonders."*

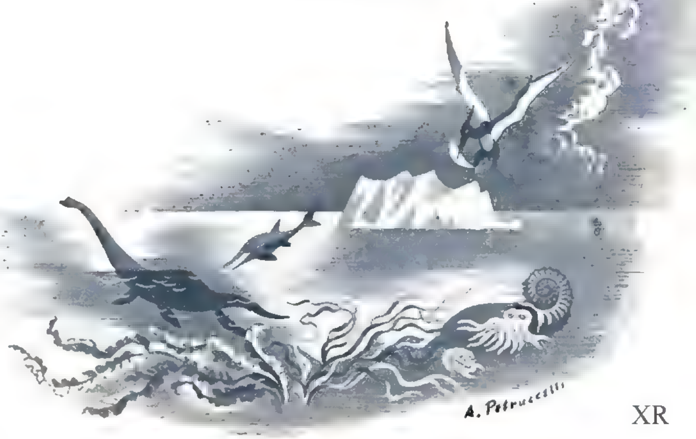
These words in Life's issue of Dec. 8 will introduce the greatest series of science stories we have ever produced. In stature and treatment this group of articles will be comparable to Life's *History of Western Culture*, which was eventually published as a book. The subject of the new series, the most fascinating in the world, is the world itself. It will present knowledge born of human curiosity about the forces which shape the familiar features of nature and influence our everyday life.

In the course of a dozen major articles which will appear during the next two years, we will explore the world around us, to bring you for the first time a unified, understandable picture story of the planet Earth. A score of artists and photographers, directed by a special research team, will translate the newest of scientific findings into the finest of paintings and photographs. In these articles you will *see* the earth as it was in the beginning. You will see fantastic landscapes which lie beneath the seas. You will see the origin and evolution of life, the birth and death of stars in outer space. Complementing and supporting these scenes you will find words whose color and imagery rival the pictures themselves. The story of "The World We Live In" will be written by Lincoln Barnett, one of the most literate authors in the field of science, whose *The Universe and Dr. Einstein* proved his rare ability to handle difficult material with simplicity and grace.

The first essay, in the Dec. 8 issue, is called "The Earth is Born." Here, in 15 pages of color, the great events of our planet's tumultuous life span are depicted by Artist Chesley Bonestell: the churning cloud of cosmic dust from which formed the clot of molten matter that was the infant earth; the rock-masses of the first continents, resting in an incandescent ocean of liquid stone; the birth of the seas as torrential rains cascaded onto the earth's cooling crust; the early landscape, harsh-contoured and forbidding, with treeless peaks rising above blood-red lakes; the massive glaciers, scouring the face of the land with mile-deep mountains of ice; and finally the blazing, blinding holocaust which will mark the end of life on earth.

The Editors





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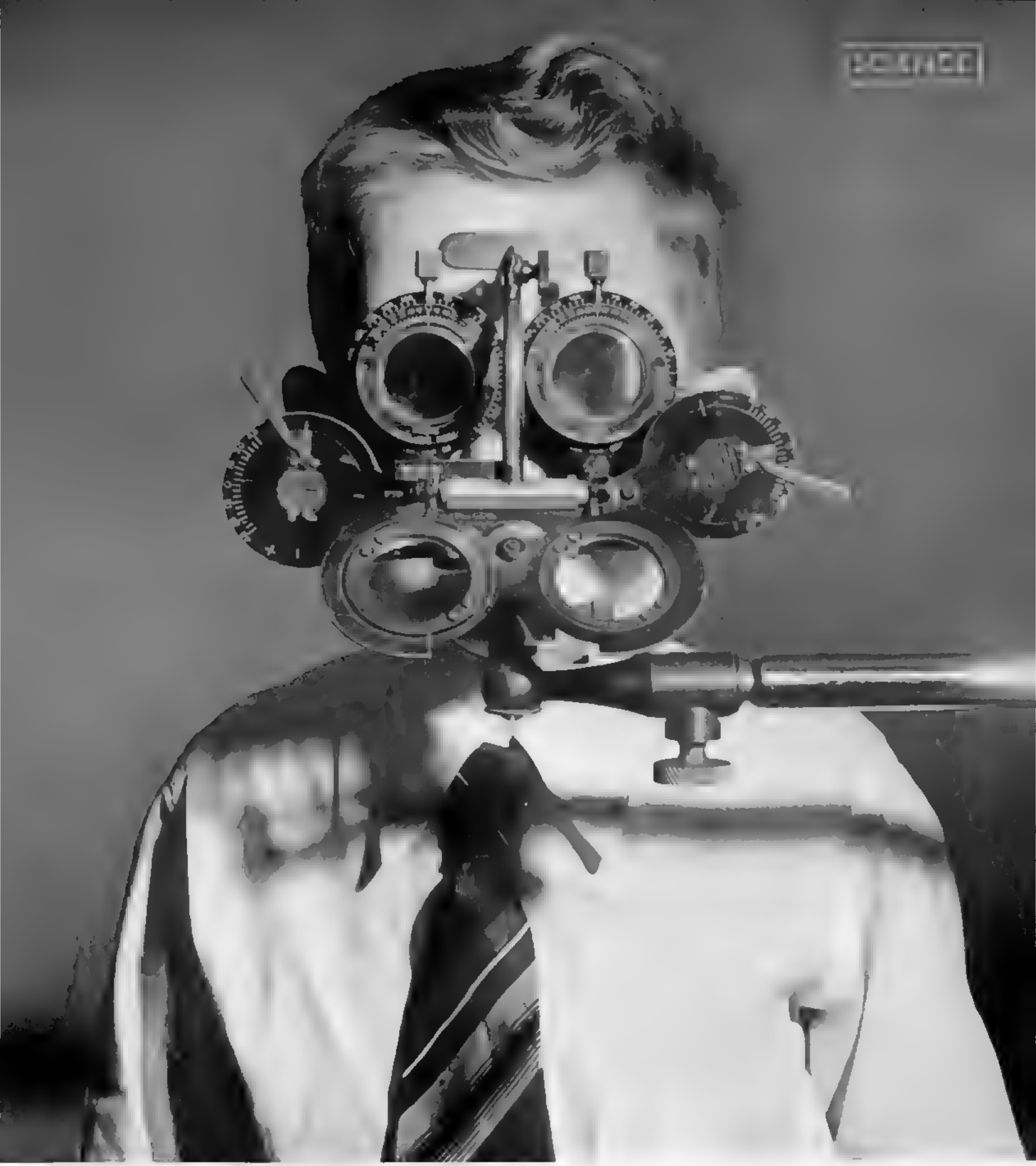

PHOROMETER MEASURES THE ABILITY OF THE EYES TO MAINTAIN FUSION. SOMETIMES POOR FUSION IS AGGRAVATED BY GLASSES, WHICH ARE RARELY A CURE FOR DYSLEXIA

DYSLEXIA

Clinical gadgets amuse children while curing reading difficulties

Millions of children in the U. S. suffer from dyslexia which is the medical term for reading difficulties. It is responsible for about 70% of the school failures in 6 to 12 year age group, and handicaps almost 15% of all grade-school children. Dyslexia may stem from a variety of physical ailments or combination of them —glandular imbalance, heart disease, eye or ear trouble—or from a deep-seated psychological disturbance that "blocks" child's ability to learn. It has little or nothing to do with intelligence and is usually curable.

To analyze and cure reading difficulties Chicago's Dyslexia Institute, in Wesley Memorial Hospital on the downtown campus of Northwestern University, has set up a clinic equipped with Man-from-Mars machines that amuse the young patients while diagnosing their ailments. After a series of exhaustive tests, the Institute's specialists get together to determine the causes of the trouble and the treatment needed.

STABILITY

Balanced control of raw materials, mills and package fabrication

CONTAINER CORPORATION OF AMERICA

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LUMBER
A. M. CASSANDRE

LA DOMENICA DEL CORRIERE

Supplemento settimanale illustrato del nuovo CORRIERE DELLA SERA - Abbonamenti: Italia, anno L. 1400, sem. L. 750 - Estero, anno L. 2000, sem. L. 1050

Anno 56 -- N. 33 15 Agosto 1954 L. 30.

Il tricolore sul K 2. *Sabato 31 luglio la spedizione del Club Alpino Italiano all'Imalaia ha conquistato la seconda vetta del mondo (m. 8610). Sulla piccozza che i protagonisti della meravigliosa impresa alpinistica hanno piantato sulla cima della ciclopica montagna, più ardua anche dell'Everest, oltre alla nostra bandiera erano legati quella del Pakistan, nel cui territorio si trova il K 2, e il gagliardetto del Club Alpino.* (Dis. di G. De Gasperi. Vedi articolo a pagina 7)

XR

SPAN OF LIFE GROWS LONGER

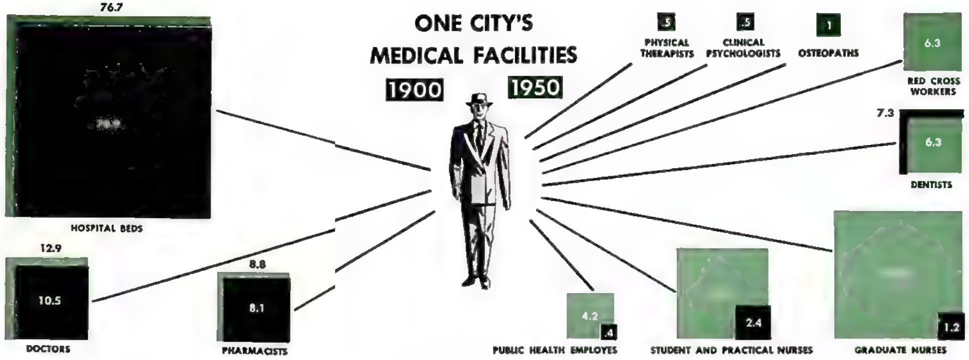
Medicine means doctors and the tools and facilities they have at hand. There were a lot of doctors in 1900, about as many as today on a per capita basis, and they gave their patients the best treatments they knew. But when it came to medication, the family doctors with their calomel and strychnine were not much more effective than the bloodletting leeches of the Middle Ages.

The physician of 1900 knew the importance of antisepsis, but he rarely practiced it. He knew that bacteria were the cause of many diseases, but he had few specific drugs or serums against them. Nearly every drug now in use, from aspirin to aureomycin, has been discovered in the past 50 years. Their dramatic effects on health and life span are charted below. As the antibiotics and sulfa drugs came into being, the most lethal infectious diseases came under control. Pneumonia, influenza and diarrhea, deadly 40 years ago, are no longer very dangerous. Polio and a few other virus-caused diseases have not yet been defeated but undoubtedly will be. The main killers yet to be overcome are not caused by germs: they are cancer and most of the heart diseases.

Medicine has also progressed in other ways. Diagnosis has been made surer by chemical tests and the X-ray. Reliable anesthetics are available. Doctors have learned a good deal about the functions of vitamins, glandular secretions and minerals. And after a period of intense specialization, they have returned to treating the "whole man," recognizing that ills may stem from the mind as well as the microbes.

The chart at right contrasts the medical facilities of Wichita, Kan. in 1900 and 1950. There has been little expansion per capita in most of the major facilities, though new services have been added. But the tools of medicine have improved so much that a country doctor of 1950 is a thousand times more effective than a king's physician in 1900.

ONE CITY'S MEDICAL FACILITIES



ADDITIONAL MEDICAL SERVICES

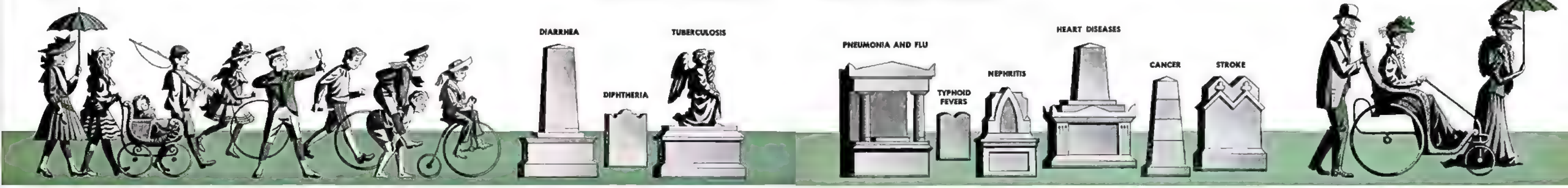
Available in 1900:
Office of the Poor Commissioner
One child-placing agency

Available in 1950:
Wichita Tuberculosis Association
Kansas Division of Vocational Rehabilitation
American Cancer Society
National Foundation for Infantile Paralysis
Medical Service Bureau
Three medical social workers
Sixty-nine care homes
Eighteen medical laboratories
Five child-placing agencies
Two agencies to aid crippled children

←**WICHITA'S** medical services per 10,000 population for 1900 and 1950 are listed at the left and above. These figures are based on records of the city's public health department.

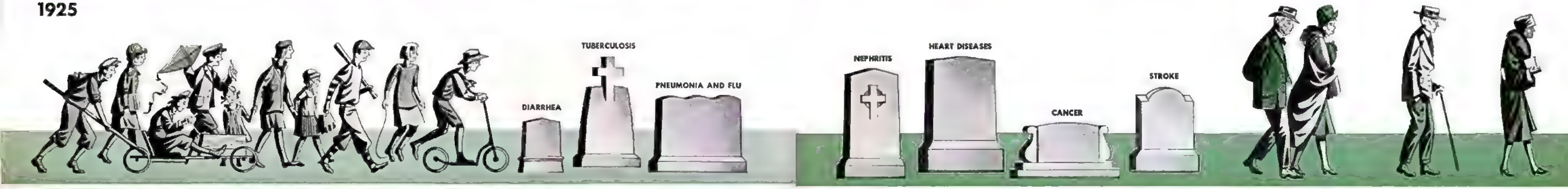
THE FIGHT AGAINST DEATH AND DISEASE

1900



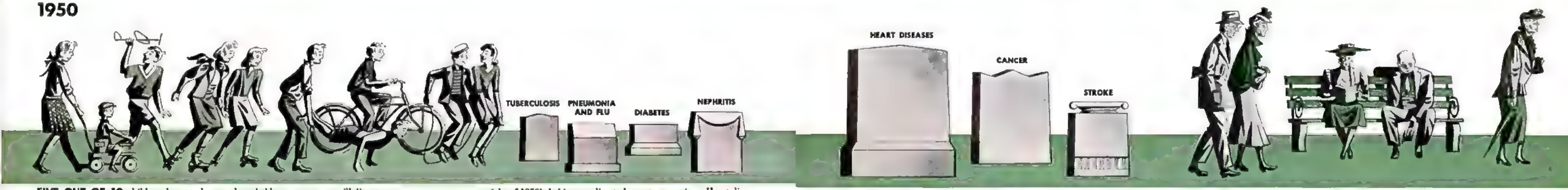
THREE OUT OF 10 children born in 1900 were all that could expect to reach the age of 70 (*right*). In the course of their lifetimes they were most likely to be struck down by the diseases listed above the tombstones, whose sizes indicate the relative number of deaths caused by these diseases. Sanitation was generally poor, infant mortality was high, and infectious diseases were the main killers. Reliable methods of diagnosis had not yet been developed. Deaths per 10,000 population were: pneumonia and influenza, 20.2; tuberculosis, 19.4; diarrhea, 14.3; heart diseases, 13.7; stroke, 10.7; nephritis, 8.9; cancer, 6.4; diphtheria, 4.0; typhoid and paratyphoid fevers, 3.1.

1925

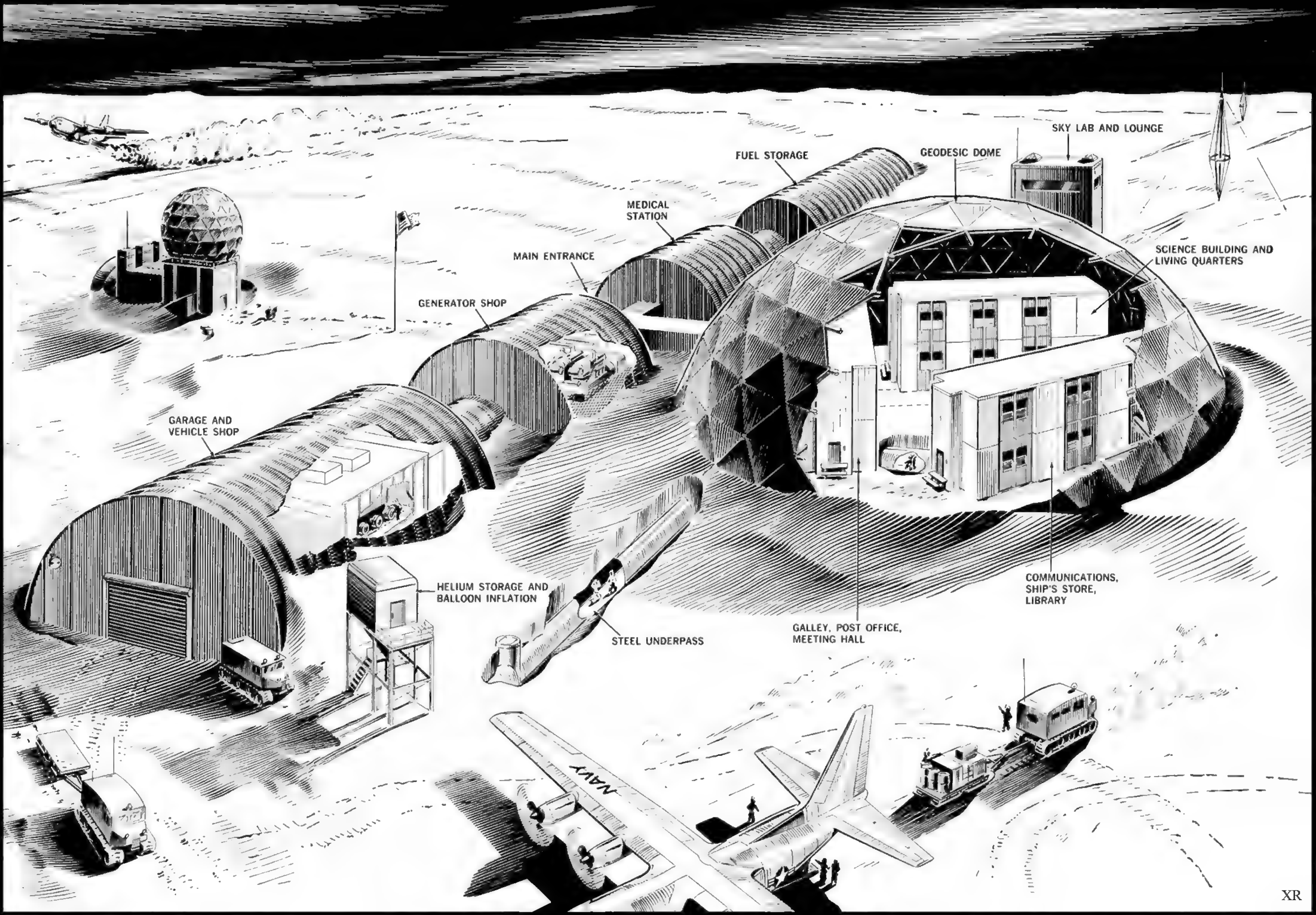


FOUR OUT OF 10 children born in 1925 were expected to reach the age of 70. There was a decided drop in deaths from the infectious diseases as a result of the improvements in sanitation and of the use of vaccines and antitoxin serums to prevent the outbreak of disease. Diphtheria and the typhoid fevers had been eliminated as major causes of death. But heart diseases were showing a steady increase, partly attributable to an aging population and partly to a speed-up in the tempo of living. Deaths per 10,000 population were: from heart diseases, 18.5; pneumonia and influenza, 12.2; nephritis, 9.5; cancer, 9.2; stroke, 9.0; tuberculosis, 8.5, and diarrhea, 3.9.

1950



FIVE OUT OF 10 children born today—and probably even more—will live to be 70. New cures and treatments will be found as these children grow older, so that as many as seven or eight of 1950's babies may live to be septuagenarians. Heart diseases and cancer are now leading causes of death, and the emphasis of medicine has shifted from infectious diseases to noninfectious and degenerative diseases. More people than ever before are getting the proper medical care as a result of health insurance. Deaths per 10,000 population (in 1947) were: heart diseases, 32.1; cancer, 13.2; stroke, 9.1; nephritis, 5.6; pneumonia and influenza, 4.3; tuberculosis, 3.4; diabetes, 2.6.


SKY LAB AND LOUNGE
GEODESIC DOME
FUEL STORAGE
MEDICAL STATION
MAIN ENTRANCE
SCIENCE BUILDING AND LIVING QUARTERS
GENERATOR SHOP
GARAGE AND VEHICLE SHOP
HELIUM STORAGE AND BALLOON INFLATION
STEEL UNDERPASS
GALLEY, POST OFFICE, MEETING HALL
COMMUNICATIONS, SHIP'S STORE, LIBRARY
NAVY
XR

Men Who Plan beyond Tomorrow Like CANADIAN Whisky at its Glorious Best!

MC2
PEIPING
MOSCOW
PARIS
LONDON
CHICAGO
NEW YORK
IMPORTED
Seagram's
V.O.
CANADIAN WHISKY
A BLEND
OF RARE SELECTED WHISKIES
DISTILLED, AGED AND BLENDED UNDER THE SUPERVISION OF THE CANADIAN GOVERNMENT
THIS WHISKY IS SIX YEARS OLD
86.8 PROOF

Moscow-Chicago "Flight 2" wheels into its glide to the North Pole Airport of *Tomorrow*...half-way stop on shorter routes over the top of the world. Built on eternal ice, the airport will be heated and automatically kept snow-free by radio rays. With administration buildings, maintenance hangars and hotel accommodations, it's being projected *now* by aviation engineers . . . Men Who Plan Beyond Tomorrow!

* * *

SEAGRAM thought of the future six years ago. When "Gone With the Wind" topped the best-seller lists. When the German dirigible Hindenburg burst into flames at Lakehurst. 'Way back then, the fine whiskies in Seagram's V. O. CANADIAN were carefully blended for flavor and stored away to mellow. Through six calendars these rare whiskies have been treasured for *Tomorrow* . . . so the V. O. of today will always be smooth and gracious—preferred for the WORLD'S LIGHTEST HIGHBALL.

Seagram's V.O. CANADIAN

CANADIAN WHISKY • A BLEND OF RARE SELECTED WHISKIES

Six Years Old—86.8 Proof. Seagram-Distillers Corporation, New York

XR

Men Who Plan beyond Tomorrow Prefer the World's Lightest Highball!

JOSEPH E. SEAGRAM & SONS LIMITED
IMPORTED
Seagram's
V.O.
CANADIAN WHISKY
A BLEND
THIS WHISKY IS SIX YEARS OLD
86.8 PROOF

TOMORROW'S HELICOPTER COMMUTER!

Step from your office building terrace into your Helicopter and commute to your hunting lodge on a mountain lake 200 miles away! That's more than a commuter's dream, for the Helicopters already designed will make it possible for you *Tomorrow!* You can take off and land vertically . . . and fly so fast that your hide-out in the woods will be only minutes away!

* * *

SEAGRAM was planning for *Tomorrow* six long years ago, when Germany pledged the neutrality of Belgium . . . "The Life of Louis Pasteur" won the Motion Picture Academy award as America's outstanding movie . . . when the United States won the Davis Cup tennis matches from Britain. And when the rare, fine whiskies in Seagram's V. O. CANADIAN were carefully blended and stored away, to age and mellow through the seasons . . . so the V.O. of today would always give you graciously the WORLD'S LIGHTEST HIGHBALL.

Seagram's V.O. CANADIAN

CANADIAN WHISKY • A BLEND OF RARE SELECTED WHISKIES

Six Years Old — 86.8 Proof. Seagram-Distillers Corporation, New York

XR

"IT OUGHT TO GET A WAR MEDAL"

THIS little tube *can't* help you smell. But it *can* help you talk, see and hear. Right now, it helps direct guns, planes, ships. It ought to get a war medal.

It has given birth to a new art called Electronics.

In 1912 in the Bell Laboratories, Dr. H. D. Arnold made the first effective high-vacuum tube for amplifying electric currents.

Vacuum tubes made possible the first transoceanic telephone talk by the Bell System in 1915.

Vacuum tubes are used on practically all Long Distance circuits to reinforce the human voice.

That's why you can talk across the continent so easily.

Over 1,250,000 electronic tubes are in service in the Bell System. Bell Laboratories developed them, Western Electric made them.

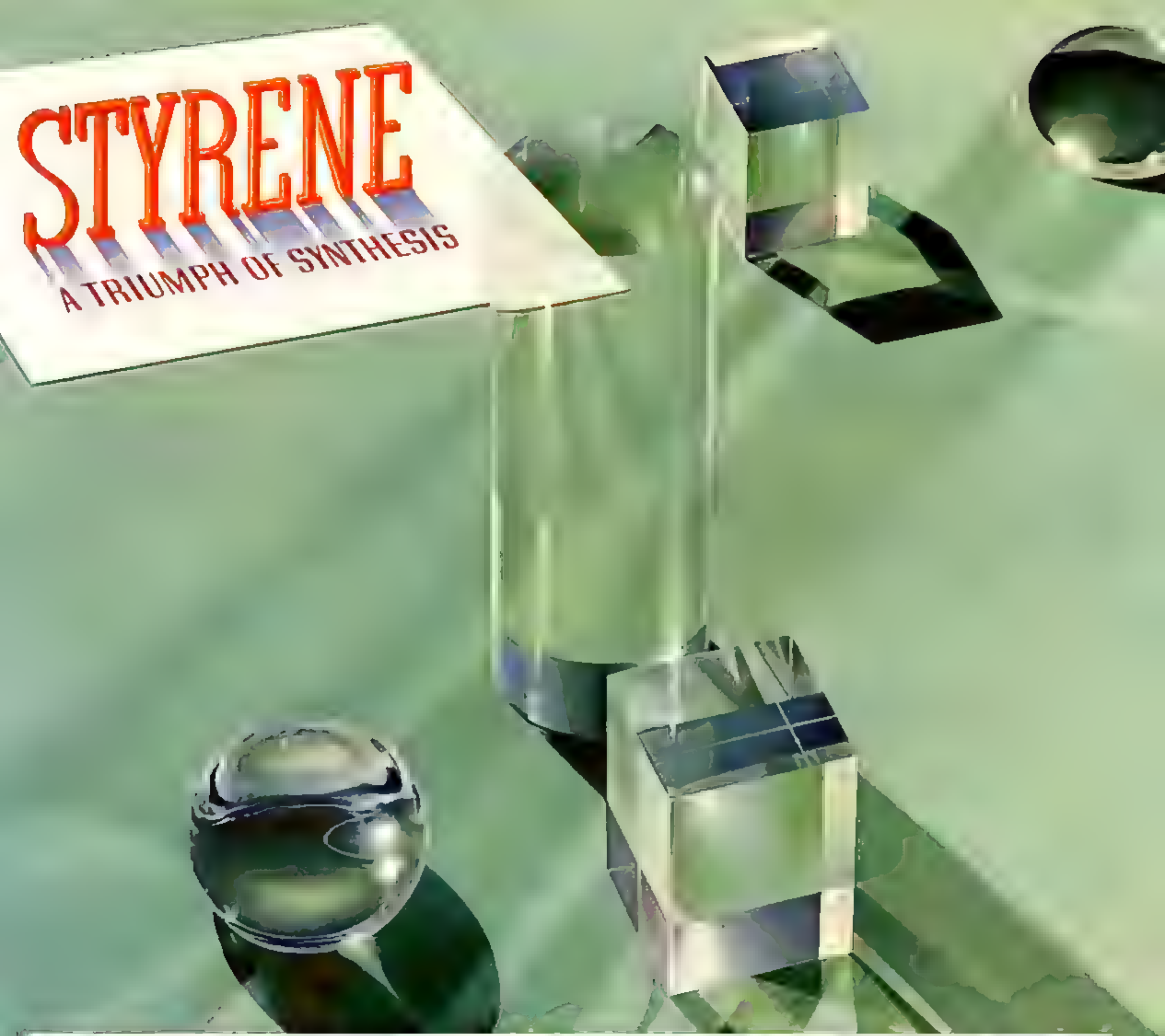
But both Laboratories and Western Electric are busy now with war — turning out tubes and putting them to work in many a device to find and destroy the enemy on land, in the air, and under the sea.

After the war, this Bell System army of tubes will work in thousands of ways for peace.

BELL TELEPHONE SYSTEM

HELP THE WAR BY MAKING ONLY VITAL CALLS TO WAR-BUSY CENTERS. THAT'S MORE AND MORE ESSENTIAL EVERY DAY.

XR



STYRENE

A TRIUMPH OF SYNTHESIS

More than one industry will welcome the news of American made monomeric Styrene.

This remarkable material possesses such a wide range of applications that its present uses represent only a meager measure of its potentialities.

Technically speaking, monomeric Styrene is a water-white liquid that readily polymerizes (solidifies) into a thermo-plastic resin of crystal-like clarity.

Due to its high dielectric characteristics it is of special interest to the great electrical industry—particularly for insulation in high frequency equipment.

A similar application is the opportunity to incorporate monomeric Styrene into varnishes, thereby giving them the added value of insulation.

There is every reason to believe that Styrene will mark a new era in the production of optical equipment. This material is actually more brilliant than glass—possessing a refractive index of 1.59 against 1.51 for ordinary glass and is more transparent than glass.

This marked brilliancy coupled with speedy and accurate moulding suggests a new, low-cost method of producing optical lens systems and similar applications.

The sheer beauty of Styrene in the solid state will, of course, find it eagerly used for a host of decorative products and purposes.

Thus progress, as exemplified by synthetically made materials, is emphatically emphasized in Dow's perfection of the process which now makes monomeric Styrene finally available, on a low-cost basis, to American industry.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

Branch Sales Offices: 30 Rockefeller Plaza, New York City • Second and Madison Streets, St. Louis • 135 S. La Salle St., Chicago

*Trade Mark Registered U. S. Patent Office

DOW

CHEMICALS INDISPENSABLE
TO INDUSTRY

PM XR

IT belongs to Mother Nature! Yes, it's just plain, ordinary clover...but, within each one of its tiny roots are "nodules"... each one a chemical plant producing nitrogen. WITHOUT THEM WE ALL WOULD HAVE STARVED TO DEATH LONG AGO! Time was when nature alone provided all the nitrogen man needed. TODAY, WITH OUR HIGHER STANDARD OF LIVING, NATURE NEEDS HELP! So, Spencer Chemical Company makes thousands of tons of nitrogen . . . thence other chemicals for industry and agriculture . . . from a "plant" which covers hundreds of acres . . . makes them just as Mother Nature makes them . . . from natural gas . . . air . . . water. Thus, our stepped-up living is served by stepped-up industry. Spencer will continue to produce chemicals in greater quantities . . . chemicals as vital to life . . . as life itself.

SPENCER

SPENCER CHEMICAL COMPANY

EXECUTIVE AND SALES OFFICES
DWIGHT BLDG., KANSAS CITY 6, MO.

XR

One of a series illustrating Cyanamid's many activities.

"...and they lived happily ever after!"

january 1945

Cynics to the contrary, endings in real life frequently turn out the way they do in story books. This story concerns the thousands of people afflicted with an incurable disease—pernicious anemia—who are now leading active, happy lives, thanks to the use of liver extracts.

After it was known that liver contains a principle exceedingly active for treating pernicious anemia, the problem was how to obtain this principle in a concentrated form for injection.

Realizing the benefits such an extract would bring, research workers at Lederle Laboratories planned and carried out a program of research which resulted not only in producing the desired concentrate but also in making liver extracts available on a commercial scale. And through continuing research, Lederle has made further refinements of this product, so that today Solution LIVER EXTRACTS *Lederle* are accepted throughout the world as an effective weapon against pernicious anemia and other conditions. The results these extracts give are so remarkable that patients receiving regular injections under proper medical care may expect to live as long as the average person in the same age group.

Meanwhile, new uses for these liver extracts are continually being discovered. They are employed by physicians as an aid in the treatment of sprue, gout, obstetric and other anemias. The armed forces are using them for a variety of medical purposes.

The development of LIVER EXTRACTS *Lederle* is just one of the numerous ways in which this progressive medical unit of American Cyanamid is helping to promote the efficiency of medical science in safeguarding human lives.

American Cyanamid Company

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

MOLDING THE FUTURE THROUGH CHEMISTRY

XR

Fortune

One Dollar a Copy JUNE 1937 Ten Dollars a Year

A. Petruccelli

XR

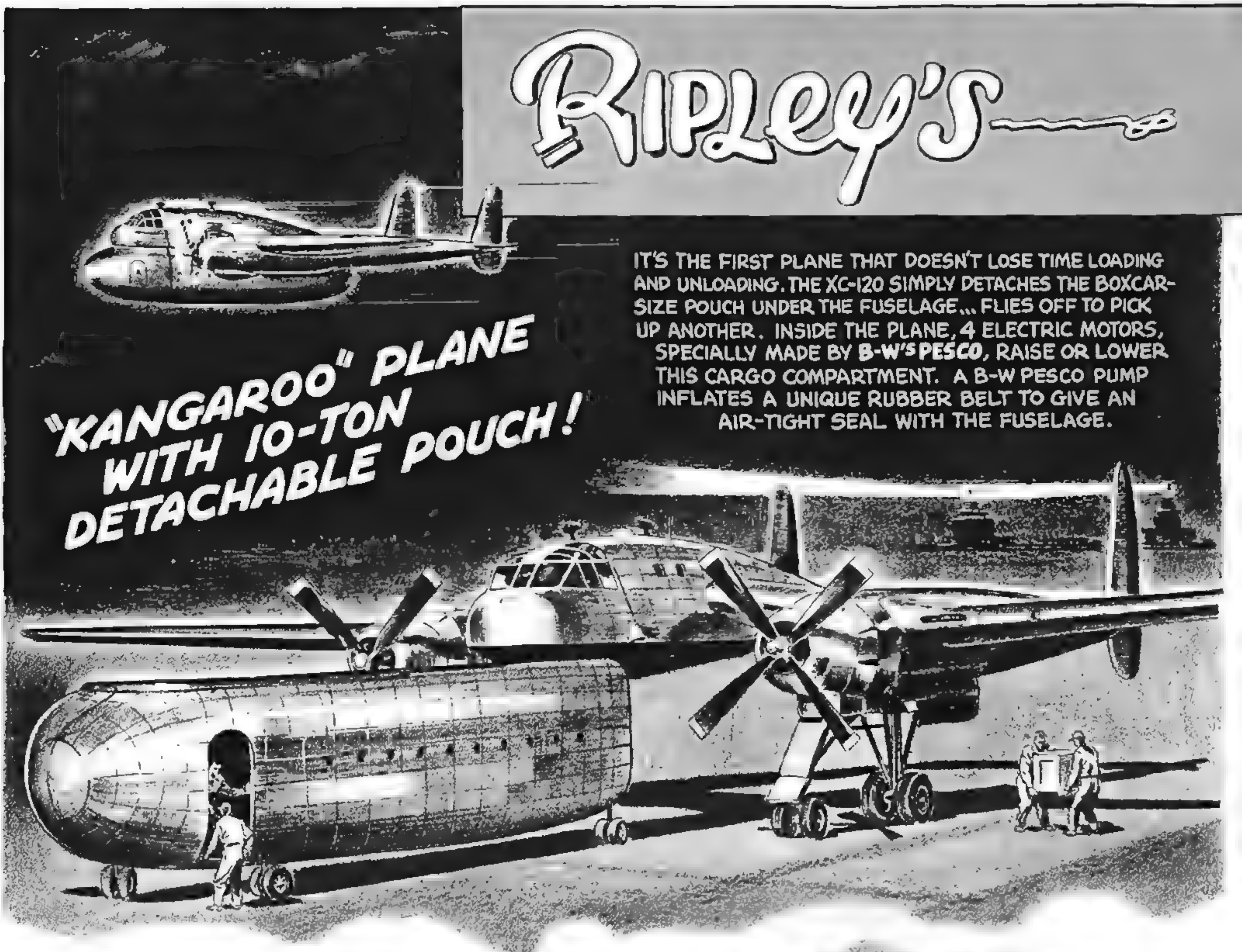
Fortune

One Dollar a Copy NOVEMBER 1935 Ten Dollars a Year

Fortune

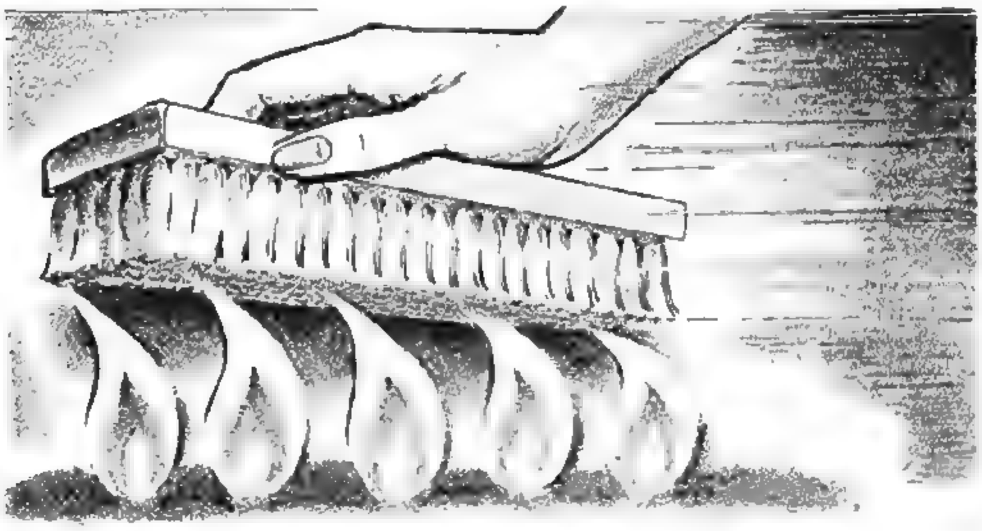
One Dollar a Copy FEBRUARY 1935 Ten Dollars a Year

RIPLEY'S



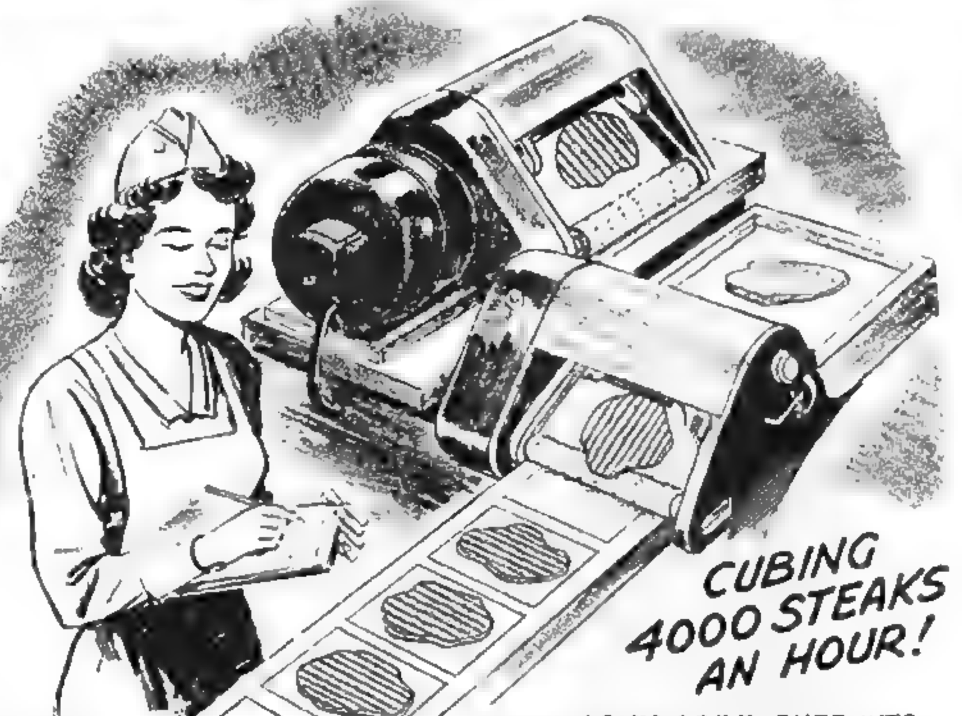
"KANGAROO" PLANE WITH 10-TON DETACHABLE POUCH!

IT'S THE FIRST PLANE THAT DOESN'T LOSE TIME LOADING AND UNLOADING. THE XC-120 SIMPLY DETACHES THE BOXCAR-SIZE POUCH UNDER THE FUSELAGE... FLIES OFF TO PICK UP ANOTHER. INSIDE THE PLANE, 4 ELECTRIC MOTORS, SPECIALLY MADE BY **B-W'S PESCO**, RAISE OR LOWER THIS CARGO COMPARTMENT. A B-W PESCO PUMP INFLATES A UNIQUE RUBBER BELT TO GIVE AN AIR-TIGHT SEAL WITH THE FUSELAGE.



"SCRUBBING" MORE HEAT OUT OF GAS!

A NEW MONEY-SAVING GAS FURNACE HAS BEEN DESIGNED BY **B-W'S INGERSOLL**. IN THIS FURNACE, THE HEAT RISING FROM THE BURNERS IS SQUEEZED THROUGH WEDGE-SHAPED CHANNELS WHERE IT IS "SCRUBBED" BY PASSING OVER A SERIES OF METAL RIDGES. THIS ACTION SAVES MUCH OF THE HEAT THAT WOULD ORDINARILY ESCAPE UP THE CHIMNEY... LESS GAS IS NEEDED TO HEAT THE HOUSE.



CUBING 4000 STEAKS AN HOUR!

ECONOMY CUTS ARE TURNED INTO TENDER LITTLE STEAKS ON A PRODUCTION LINE BASIS WITH THIS NEW CUBE STEAK MACHINE USED IN PACKING PLANTS. BY MEANS OF SPECIAL **B-W MORSE CHAINS**, HIGH SPEED ROLLERS FLIP STEAKS THROUGH THE MACHINE... PLACE EACH ON A PAPER READY FOR PACKAGING.

185 PRODUCTS IN ALL ARE MADE BY **BORG-WARNER**

XR

The Borg-Warner touch marks so many of today's exciting advances!

Ingenious automatic control mechanisms now direct manufacturing lines, chemical processing, oil refining and many other jobs with little human help. These "robots" not only have marvelous electronic brains, but they have a sense of touch that lets them keep tabs on what they're doing.

Finger-size electronic instruments (called Vibrotron* transducers) are made by Borg-Warner to give this "touch". Highly sensitive, they feel even the smallest change in temperature, pressure, velocity and such things, and report it in a way that lets the brain make corrections extra fast.

This is an example of Borg-Warner activity in just one field—*electronics*. You'll find Borg-Warner serving in most fields of new challenge and promise—such as nucleonics, missiles, jet and rocket aircraft, chemicals.

And Borg-Warner's fame as engineer and manufacturer grows daily in the fields of petroleum, building, automobiles, home appliances, steel and others. In everything B-W produces, the aim is "design it better—make it better." It is an aim that means progress. *Borg-Warner Corporation, 310 S. Michigan, Chicago 4, Illinois.*

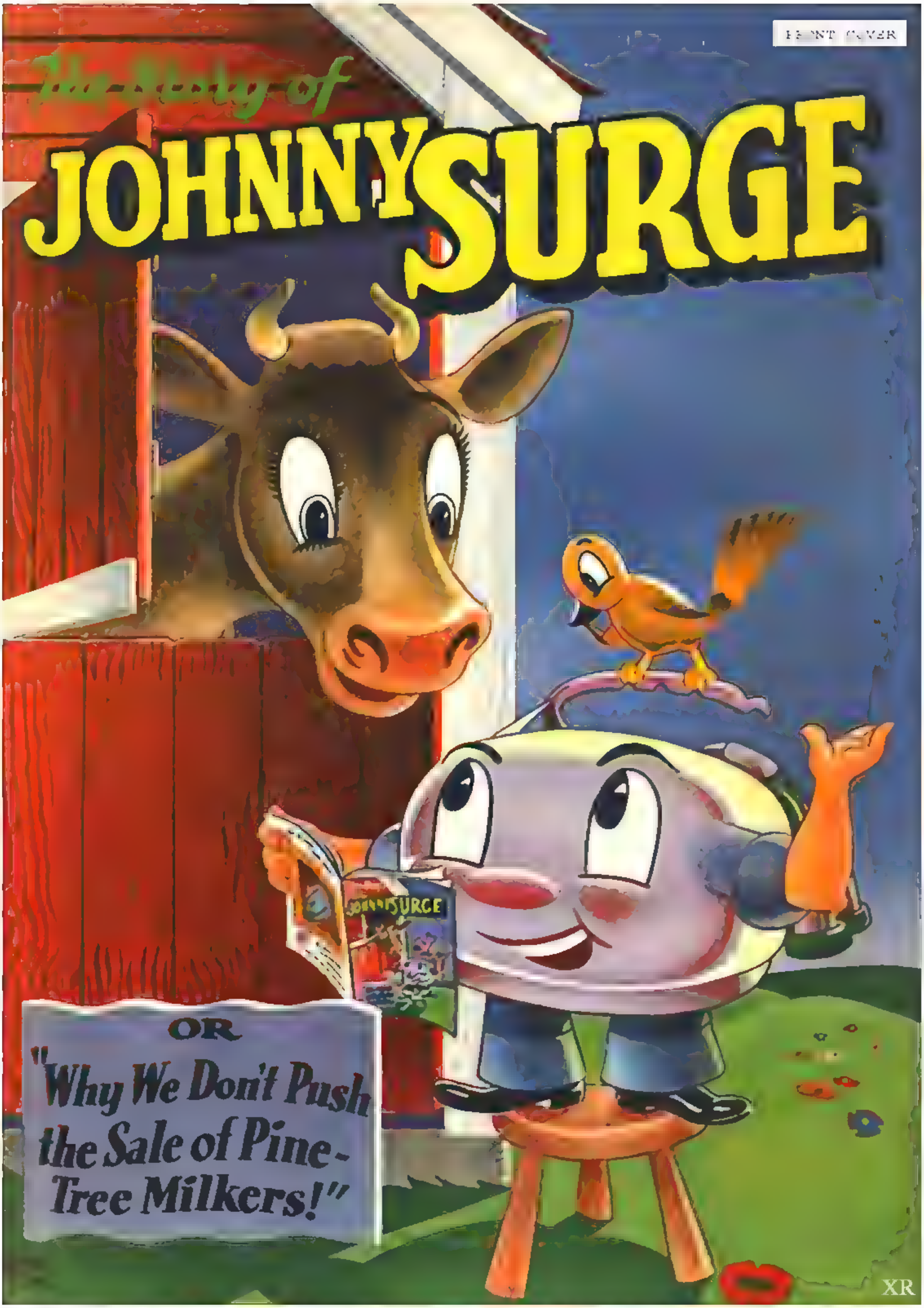
**Vibrotron is a registered trade-mark for the Vibrotron transducer manufactured by BJ Electronics Division of Borg-Warner.*

Almost every American benefits every day from the products made by

ENGINEERING B-W PRODUCTION T. M.

Borg-Warner®

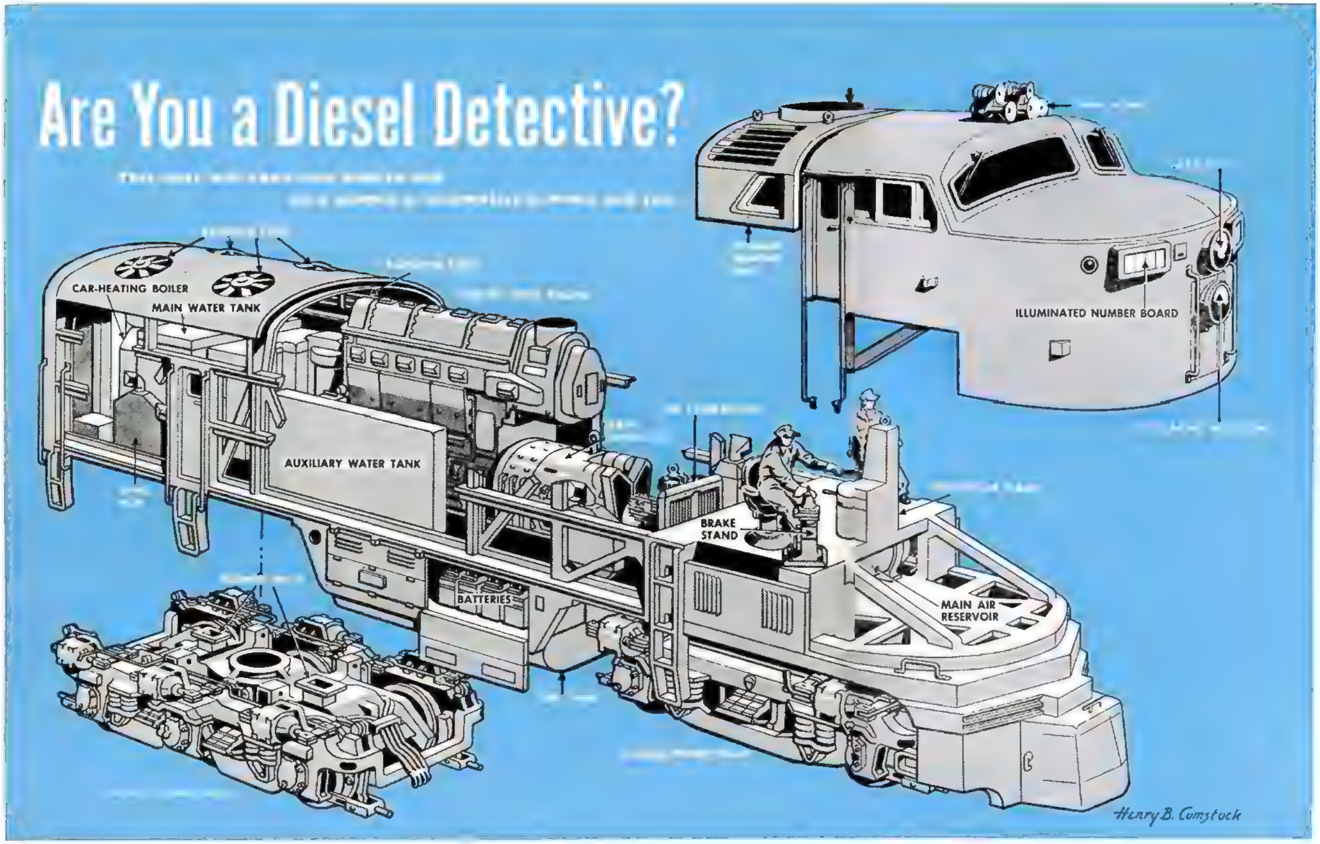
XR



The Story of JOHNNY SURGE (or 'Why We Don't Push the Sale of Pine Tree Milkers")
1947 comic book on cow teat comfort - http://www.ep.tc

A. Fetini
XR

Are You a Diesel Detective?



MANY railroad fans boast that they can identify any Diesel by the sound of the engine. But there are easier ways to tell who made it—General Motors, Alco, Baldwin-Lima-Hamilton or Fairbanks-Morse. And if your eye is sharp, you can deduce from the profile what type of service each one performs. You can test your ability by studying the numbered drawings at right.

Here are some clues:

Numbers 1, 2, 3 and 4 are all designed to meet the same requirements. Each is rated between 1,500 and 1,600 horsepower, but is the product of a different builder.

Number 5 is basically the same kind of locomotive but its stepped-in flanks and two sets of cab controls adapt it to a different type of work. All four builders manufacture this line, but the rounded roof contours are peculiar to one.

Number 6 is actually two switching locomotives, permanently coupled together and controlled from a single cab. It is used in some of our largest rail centers. This articulated design is peculiar to one builder.

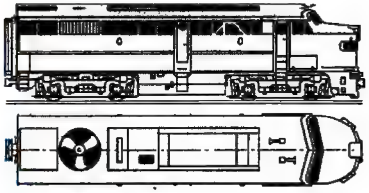
Number 7 is a 2,250-horsepower, two-engined version of a type made by all four manufacturers. Its bulbous nose identifies this one as a big brother of Number 4. The builders of locomotives 1 and 2 also turn out similar two-engined locomotives. The builder of No. 3 produces a comparable single-engined locomotive, which is shown in the exploded drawing above.

Now check your answers at right.—*Henry B. Comstock.*

WHO'S WHO IN DIESELS

Numbers 1 through 4 are road freight engines. By the addition of a car-heating boiler and a change of gearing, they may be used in passenger service. The builders are—in order—Alco, Baldwin-Lima-Hamilton, Fairbanks-Morse and General Motors. Number 5 is an Alco road-switcher type, equally at home in yard service or out on the main line hauling a short freight or a commuter train. Number 6 is a GM transfer engine. Its specialty is assembling heavy freight trains and hauling them to another yard. Number 7 is a GM passenger engine, more powerful—and therefore faster—than the freight haulers. The large drawing shows the Fairbanks-Morse version of the same job, with a six-wheel truck at the rear.

1



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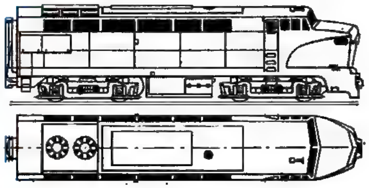
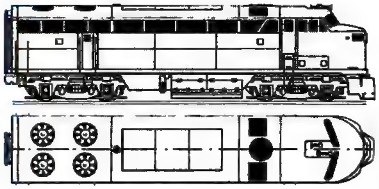
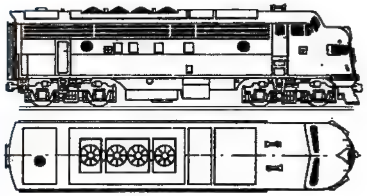
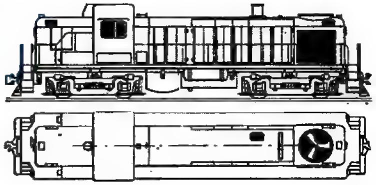
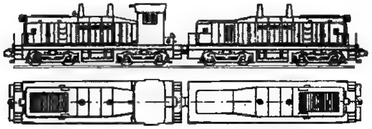
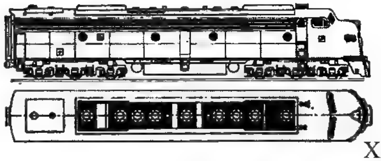












XR

"I'm all over the map at once"

"IT certainly keeps me on the go . . . my job of distributing equipment and supplies to the Bell Telephone companies throughout the nation.

"Right now I'm busier than ever . . . delivering telephones, switchboards, cable and countless other kinds of apparatus and supplies. They're all needed for the Bell System's construction program of more than $2,000,000,000 . . . to give you better-than-ever telephone service.

"I maintain 29 distributing houses at strategic locations, where I keep some 10,000 different items in stock . . . and where I also repair telephone equipment.

"And that's only part of my job. I'm *manufacturer* and *purchaser* for the Bell System . . . and I *install* central office equipment.

"Remember my name . . .

"It's Western Electric."

MANUFACTURER . . . of 43,000 varieties of telephone apparatus.

PURCHASER . . . of supplies of all kinds for telephone companies.

DISTRIBUTOR . . . of telephone apparatus and supplies.

INSTALLER . . . of telephone central office equipment.

FOR THE BELL SYSTEM

Western Electric

XR

Thoughts before operation

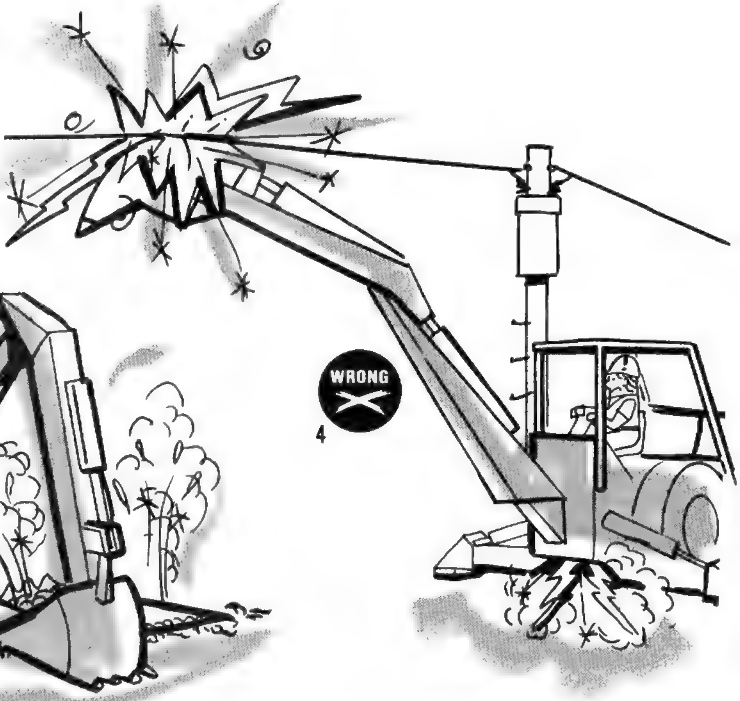
Know The Work Area

Check the area for the location of underground cables, gas lines and water mains. (3)

Know the clearances in the work area. Check clearance of overhead power and telephone lines. Never approach overhead or underground wires with any part of the machine unless proper, OSHA required, safety precautions have been taken. (4)

Inspect any new work area and check for hidden holes, drop-offs or obstacles that could be dangerous.

3



4

Avoid crossing exposed railroad tracks, ditches, ridges or curbs if possible. If crossing cannot be avoided, reduce speed and cross at an angle. (13)

13

14

Be alert to obstacles and rough terrain. If stumps or large rocks are noted, back away from them and go around. (14) Avoid soft edges and deep holes at *all* times.

TIMED FOR TOMORROW... *TIME-TESTED* ALREADY!

"NO TOP CAP CONNECTION!"
"PROVED IN RADAR—TOPS FOR FM AND TELEVISION!"
"RUGGED MOUNT SUPPORT—SHORT, DIRECT CONNECTIONS!"
"ALL-WELDED CONNECTIONS—AND A LOCK-IN LUG THAT STAYS PUT!"

LOOK AHEAD WITH THE LOCK-IN TUBE

Sylvania Electric's war-proved Lock-In Tube *anticipated* the current trend to higher frequencies—and to compact set design.

Time-tested in radar and secret radio equipment during the war, the Lock-In Tube is ideal for FM and television.

And its lower overall height makes important space savings possible.

The Lock-In Tube is here today—and ready for tomorrow!

SYLVANIA ELECTRIC

Emporium, Pennsylvania

XR

MAKERS OF RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES; FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES; ELECTRIC LIGHT BULBS

Molecular model of ethylene oxide—one of the basic building blocks in Union Carbide's chemistry.

Helping to shape the future

Ever wonder what's behind the steady stream of new and better products we enjoy today? The answer is research by men and women with driving curiosity and bold imagination.

Synthetic chemicals created by the people of Union Carbide have helped make possible the latest wonder drugs, glamorous textiles, work-saving detergents, and fast-drying paints and lacquers. And in the ever-changing world of plastics, the work of Union Carbide scientists has helped bring you everything from scuff-resistant flooring and unbreakable phonograph records to transparent polyethylene wrapping that preserves the original flavor of foods.

These innovations are only a suggestion of the wonderful things that will come from tomorrow's research . . . the kind of research that's being carried out constantly in the laboratories of Union Carbide.

Learn about the exciting work going on now in carbons, chemicals, gases, metals, plastics, and nuclear energy. Write for "Products and Processes" Booklet B, Union Carbide Corporation, 30 East 42nd St., New York 17, N.Y. In Canada, Union Carbide Canada Limited, Toronto.

UNION CARBIDE

. . . a hand
in things to come

XR

Search is exciting!

Scientists are constantly probing deeper into the secrets of nature —bringing new and better things to you

As THE PROSPECTOR thrills to the search for treasure, so does the scientist as he searches out the secrets of the earth, air, and water.

THE TREASURE that the scientist seeks is better understanding of nature, and ways to bring better living for all of us. To find them, he is constantly probing, taking the elements apart, putting them back together in different ways—always looking for something new and promising.

How important is such research? Today, more than one-third of the work of the people of Union Carbide is in providing products and processes that did not exist in commercial quantities 15 years ago. Each new product, each new process, was born of intensive search.

FROM CHEMICALS TO METALS – The results of these achievements are serving all of us today—chemicals for life-saving medicines and many other uses . . . a wide range of carbon and graphite products . . . oxygen for the sickroom and industry . . . a variety of wonderful new plastics . . . alloying metals for stainless and other fine steels.

SEARCH . . . RESEARCH? To the scientists of Union Carbide, search and research are the same—an exciting key to a brighter future for all.

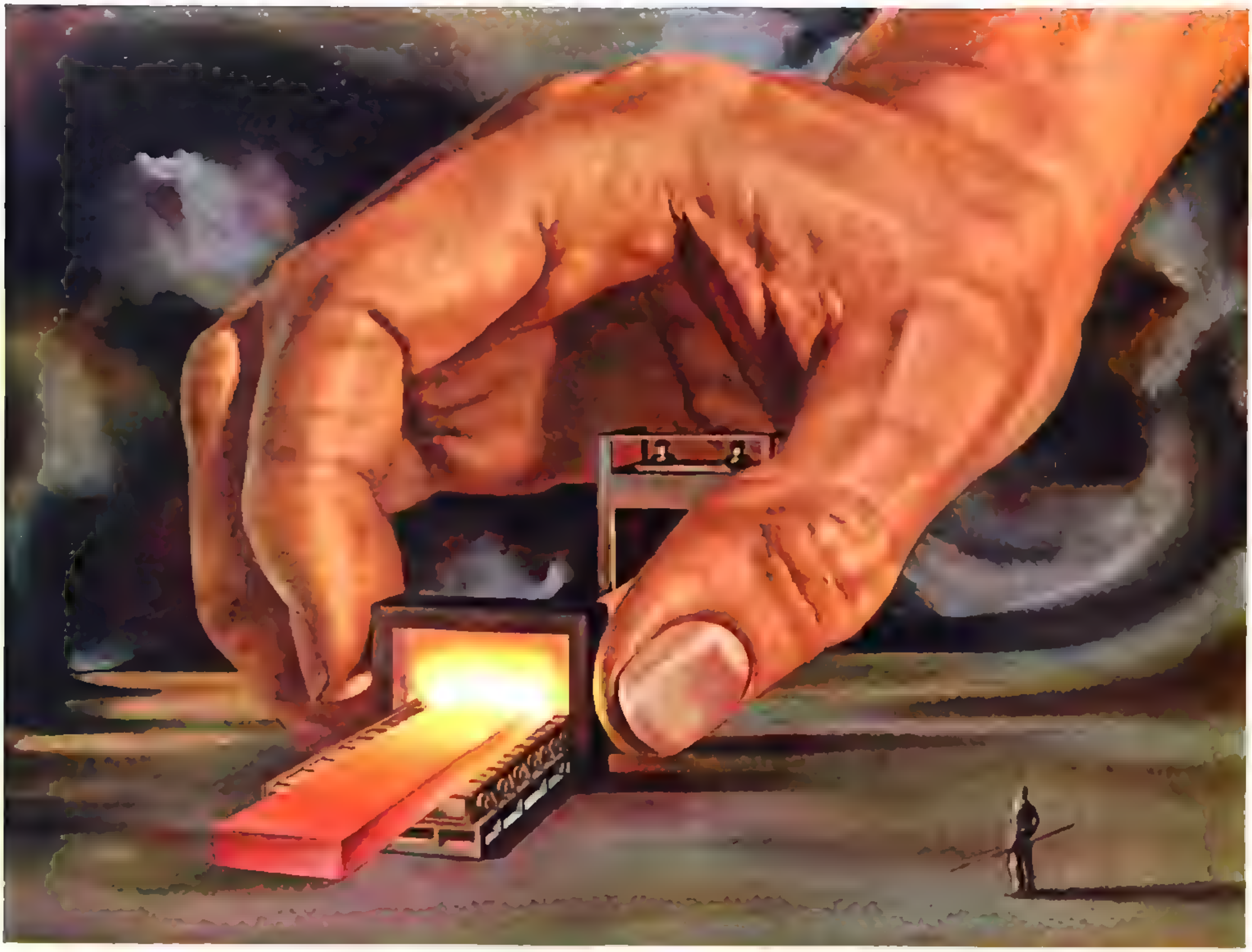
FREE: *Would you like to learn more about the many useful things research has helped bring to you? Ask for "Products and Processes" booklet XM.*

UNION CARBIDE
AND CARBON CORPORATION
30 EAST 42ND STREET UCC NEW YORK 17, N. Y.
In Canada: UNION CARBIDE CANADA LIMITED

UCC's Trade-marked Products include

SYNTHETIC ORGANIC CHEMICALS
EVEREADY Flashlights and Batteries
BAKELITE, VINYLITE, and KRENE Plastics
ELECTROMET Alloys and Metals
HAYNES STELLITE Alloys
UNION Carbide
LINDE Silicones
Dynel Textile Fibers
PRESTONE Anti-Freeze
PREST-O-LITE Acetylene
PYROFAX Gas
LINDE Oxygen
NATIONAL Carbons
ACHESON Electrodes

XR



Surface defects disappear when oxygen and acetylene team up to provide a

Smooth, flawless skin . . . for steel

YOU KNOW the steel in your automobile and refrigerator is smooth and perfect.

BUT DID YOU KNOW that to get these smooth, flawless surfaces the steel had to be 'conditioned'? This means removing the rough scale and surface defects that form on the steel ingots as the molten metal cools.

To remove these defects by hand methods required further cooling of the steel. This was a costly and time-consuming process—a bottleneck to steel production.

THROUGH BLAZING HEAT—Today, as steel travels through the mill, it passes through the 6,000-degree heat of oxy-acetylene flames. Then, while still moving at speeds up to 160-feet per minute, streams of pure oxygen are directed against its blazing hot surfaces. The scaly, scarred surfaces are instantly burned away.

The slab emerges clean—ready to be rolled into flawless sheets for your car, refrigerator, and many other useful products that serve you.

ANOTHER JOB OF UCC—Producing oxygen and acetylene for this and many other uses is one of the important jobs of the people of Union Carbide. It is one more way in which they transform the elements of nature for the benefit of all.

FREE: *Learn how ALLOYS, CARBONS, GASES, CHEMICALS, and PLASTICS improve many things that you use. Ask for "Products and Processes" booklet XK.*

UNION CARBIDE
AND CARBON CORPORATION
30 EAST 42ND STREET UCC NEW YORK 17, N. Y.
In Canada: UNION CARBIDE CANADA LIMITED

UCC's Trade-marked Products include

LINDE Oxygen PRESTONE Anti-Freeze UNION Carbide LINDE Silicones Dynel Textile Fibers NATIONAL Carbons
PREST-O-LITE Acetylene ELECTROMET Alloys and Metals HAYNES STELLITE Alloys PYROFAX Gas ACHESON Electrodes
BAKELITE, VINYLITE, and KRENE Plastics EVEREADY Flashlights and Batteries SYNTHETIC ORGANIC CHEMICALS

XR

Men Who Plan beyond Tomorrow Like CANADIAN Whisky at its Glorious Best!

SALVAGE SUBMARINES OF TOMORROW!

Already more than 40 *million* tons of shipping are estimated to have been sunk in World War II. What a treasure trove of valuable metals and non-perishable cargoes may be reclaimed with these powerful undersea craft…equipped with salvaging cables and with decompression chambers for diving operations!

* * *

SEAGRAM'S was planning for the future six years ago, when Germany, Italy and Japan signed a treaty of alliance…when Lou Gehrig set *seven* baseball records…and when "Lost Horizon" was the movie of the hour. The rare, fine whiskies that Seagram's laid away *then,* to age and mellow through the years, are ready *now* to give you Canadian whisky at its glorious best! You'll appreciate Seagram's foresight, when you enjoy the WORLD'S LIGHTEST HIGHBALL.

Seagram's V.O. CANADIAN

CANADIAN WHISKY • A BLEND OF RARE SELECTED WHISKIES

Six Years Old—86.8 Proof. Seagram-Distillers Corporation, New York

XR

CHAUNCY HALL.

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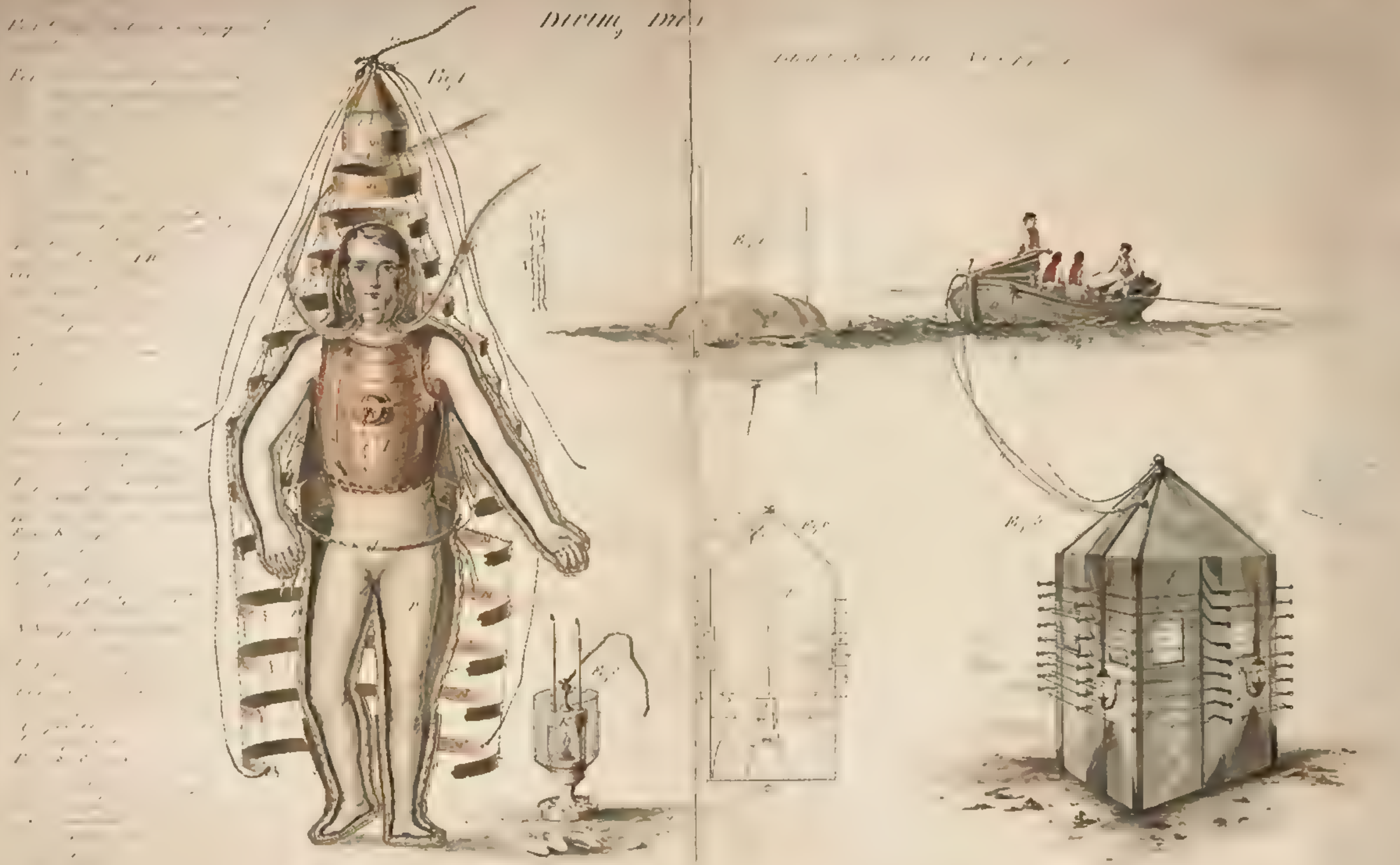

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POPULAR SCIENCE

MONTHLY

MECHANICS - AUTOS - HOMEBUILDING

25¢ July

Courteous Cops Cut Crashes

PAGE 62

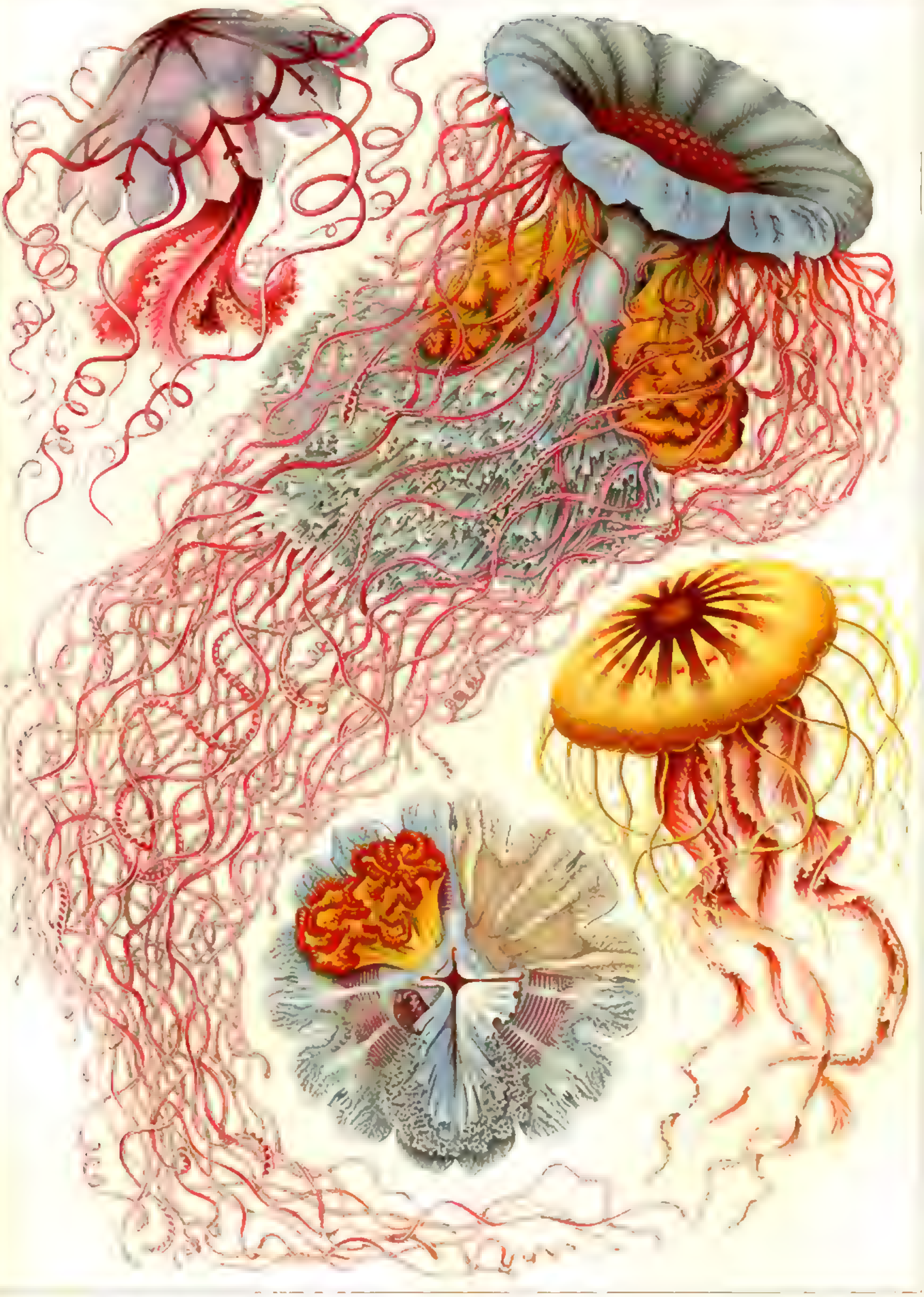
Build Your Own Diving Lung

PAGE 100

How to Outwit Poison Ivy

PAGE 116

XR



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WONDERS OF WORLD ENGINEERING

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17

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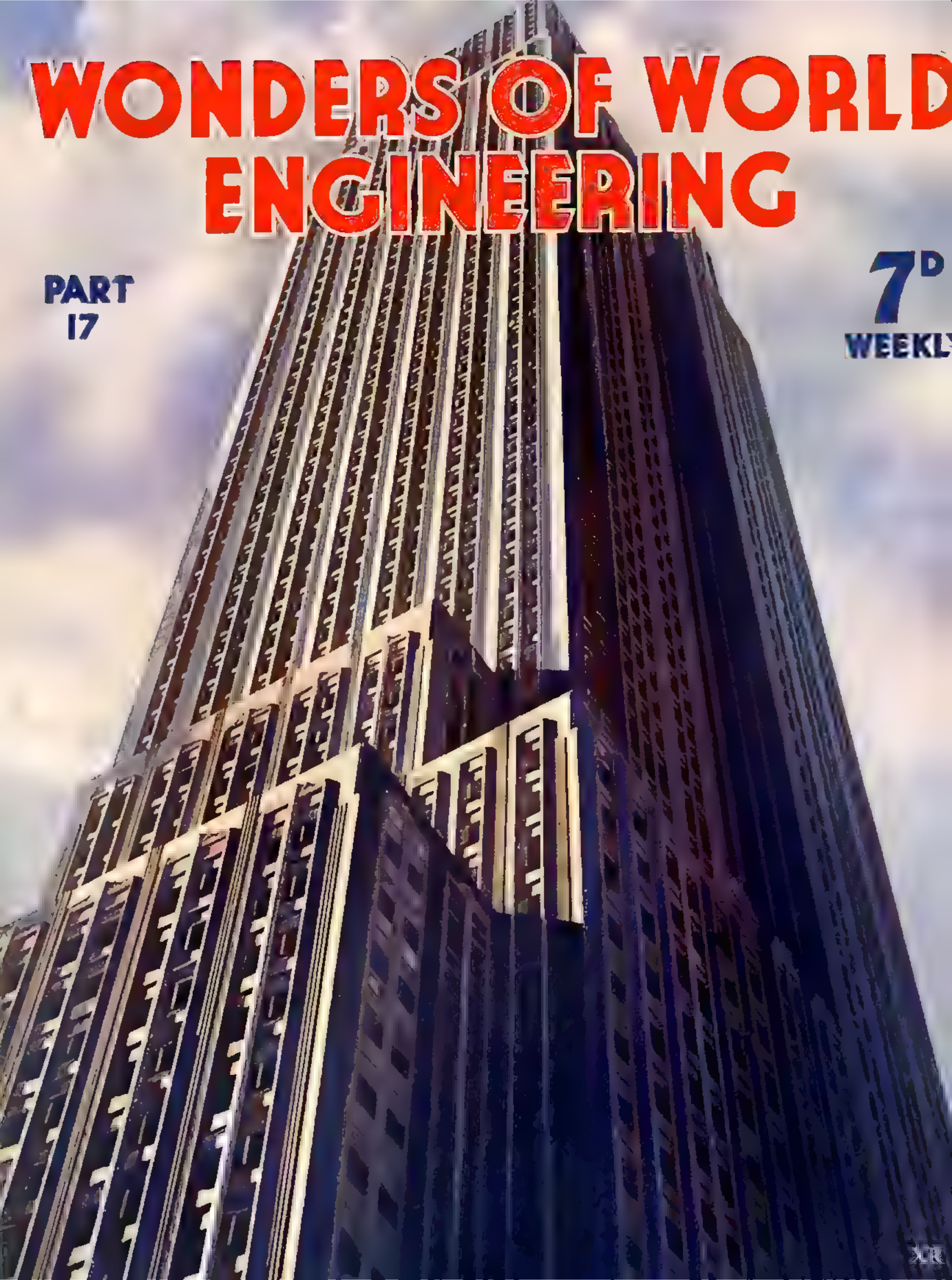
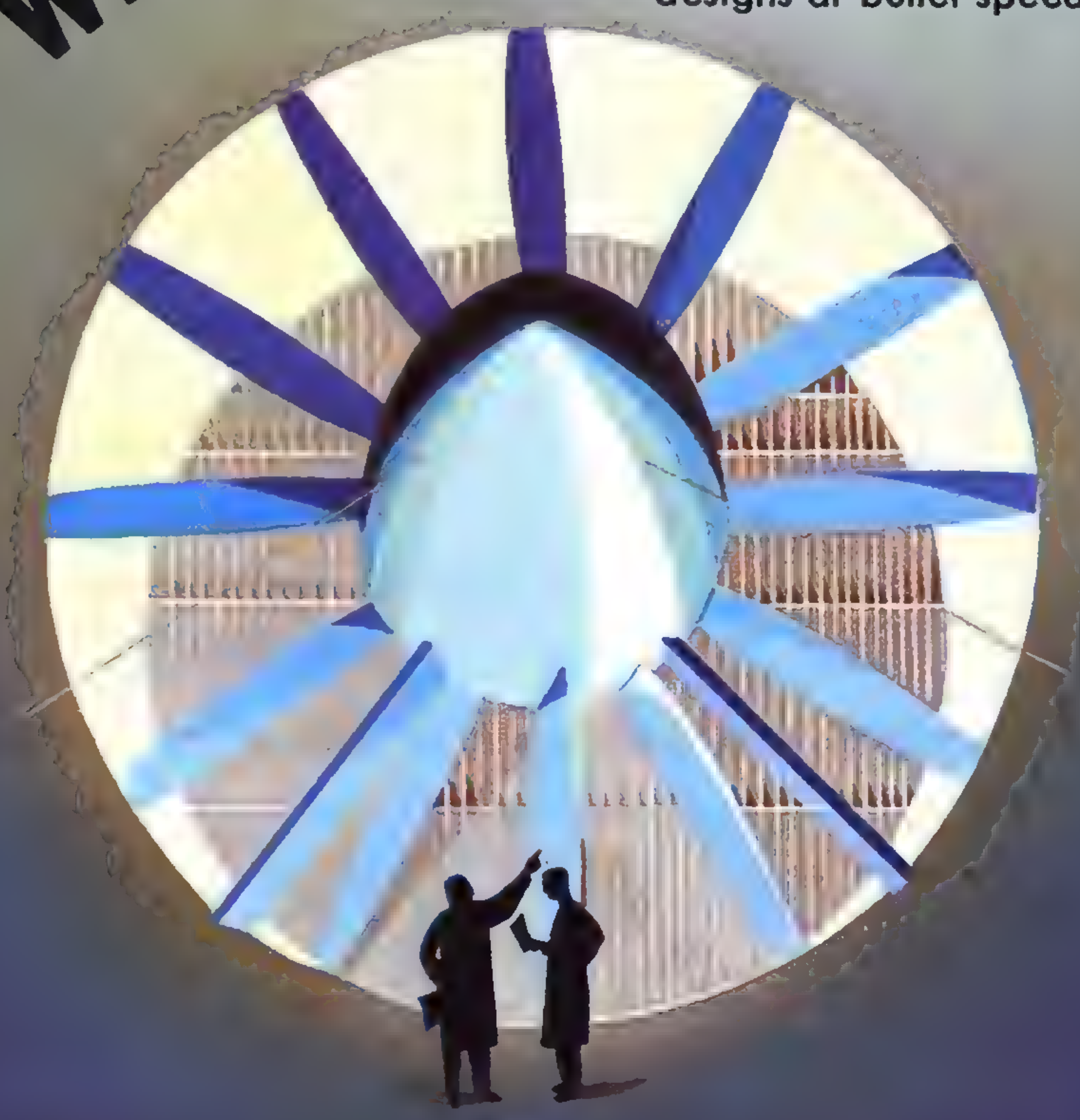


FIRST 300,000-hp WIND-TUNNEL DRIVE

Tests latest aircraft designs at bullet speeds



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Thanks to the American system of Free Enterprise, our Chemical industry has grown in a few years to number nearly 10,000 companies, directly employing more than 287,000 people. The Chemical industry is a world leader in the diversity and excellence of its numerous products and processes.

GENERAL AMERICAN serves the Chemical industry through its diversified activities of manufacturing equipment for refineries and processing plants . . . designing and building freight cars . . . operating the GATX fleet of more than 37,000 specialized tank cars of 207 types . . . operating the world's largest public storage terminals for bulk liquids. Whatever the product or transportation problem, General American has—or can design—the right car for it.

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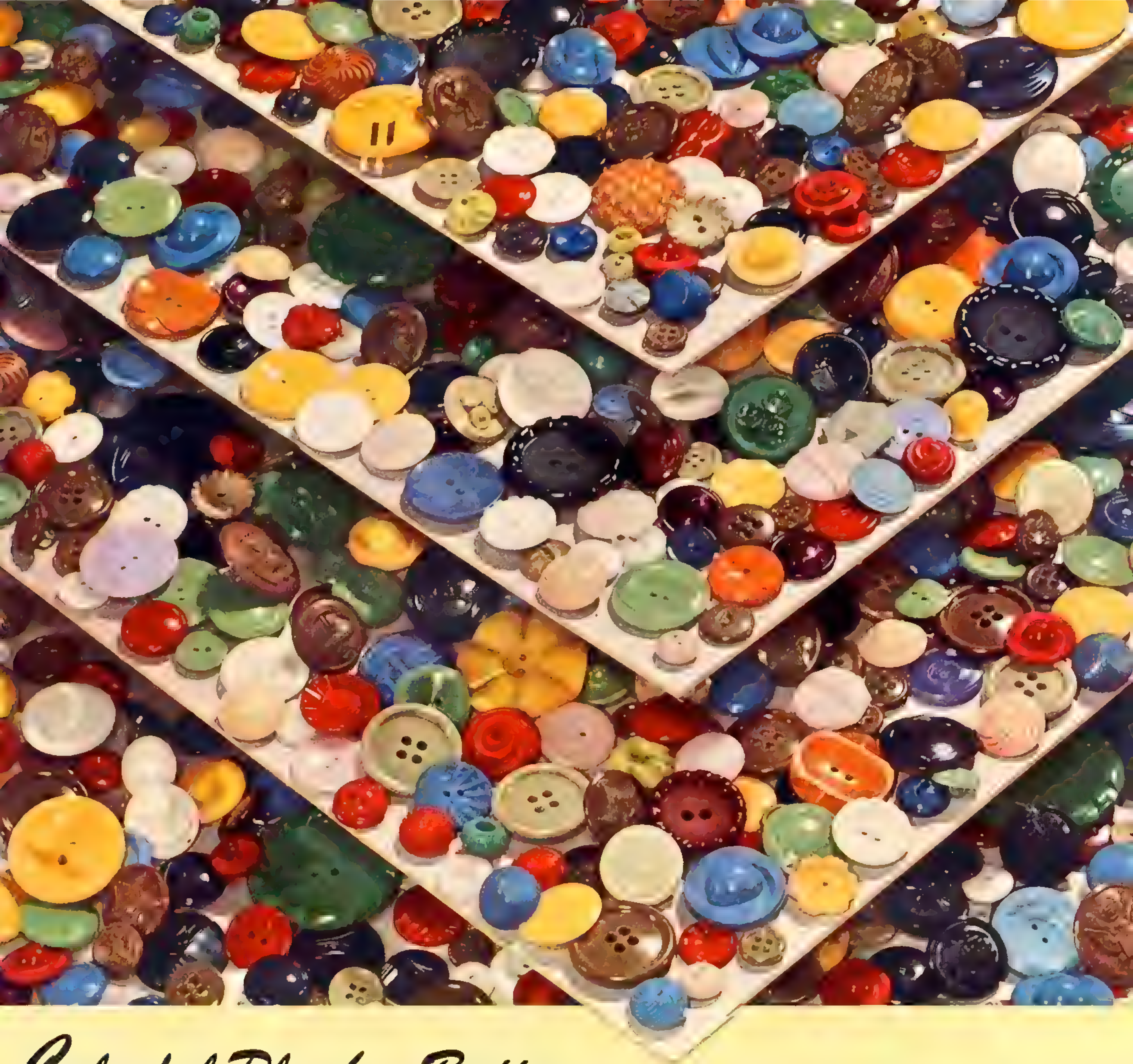


Colorful Plaskon Buttons...

in utility service all over the world!

RICH-TONED, sparkling buttons, in every color from deep, glistening black to translucent, neutral white... buttons of every conceivable design and shape... buttons in great quantities for every type of garment in Armed Forces or civilian service... these are buttons of Plaskon Molded Color.

The clean, clear tones of Plaskon buttons are uniform and unchanging, because they are solid, permanent color through and through. The hard, non-porous surface will not tarnish, check or corrode. These buttons remain glossy and sparkling despite heavy laundering, sterilizing and ironing. They won't chip or shatter because molded Plaskon is strong and shock-resistant.

Buttons of Plaskon Molded Color can be economically produced by the millions... each button exactly matching its original specifications... all holes exact... all edges smooth and easy on thread.

Buttons are only one of the many modern uses of Plaskon urea-formaldehyde and melamine-formaldehyde plastics. We shall be glad to help you adapt the many advantages of these versatile materials to your manufacturing and merchandising needs of today and the bigger markets of tomorrow.

PLASKON DIVISION, Libbey • Owens • Ford Glass Company, 2125 Sylvan Avenue, Toledo 6, Ohio

PLASKON

TRADE MARK REGISTERED

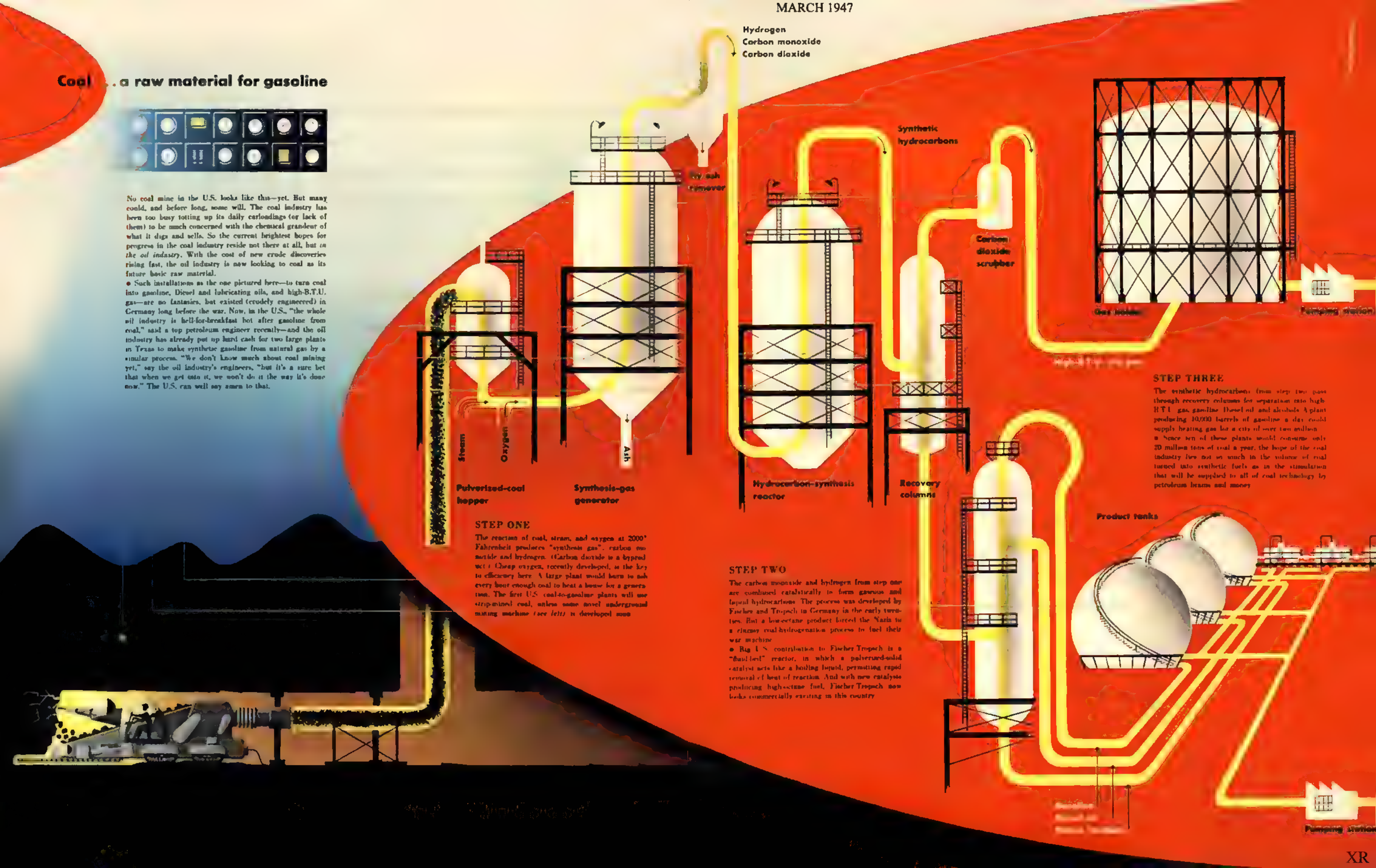
MOLDED COLOR

May 1944 XR

Coal . . . a raw material for gasoline

No coal mine in the U.S. looks like this—yet. But many could, and before long, some will. The coal industry has been too busy totting up its daily carloadings (or lack of them) to be much concerned with the chemical grandeur of what it digs and sells. So the current brightest hopes for progress in the coal industry reside not there at all, but *in the oil industry*. With the cost of new crude discoveries rising fast, the oil industry is now looking to coal as its future basic raw material.

- Such installations as the one pictured here—to turn coal into gasoline, Diesel and lubricating oils, and high-B.T.U. gas—are no fantasies, but existed (crudely engineered) in Germany long before the war. Now, in the U.S., "the whole oil industry is hell-for-breakfast hot after gasoline from coal," said a top petroleum engineer recently—and the oil industry has already put up hard cash for two large plants in Texas to make synthetic gasoline from natural gas by a similar process. "We don't know much about coal mining yet," say the oil industry's engineers, "but it's a sure bet that when we get into it, we won't do it the way it's done now." The U.S. can well say amen to that.



STEP ONE

The reaction of coal, steam, and oxygen at 2000° Fahrenheit produces "synthesis gas": carbon monoxide and hydrogen. (Carbon dioxide is a byproduct.) Cheap oxygen, recently developed, is the key to efficiency here. A large plant would burn to ash every hour enough coal to heat a house for a generation. The first U.S. coal-to-gasoline plants will use strip-mined coal, unless some novel underground mining machine *(see left)* is developed soon.

STEP TWO

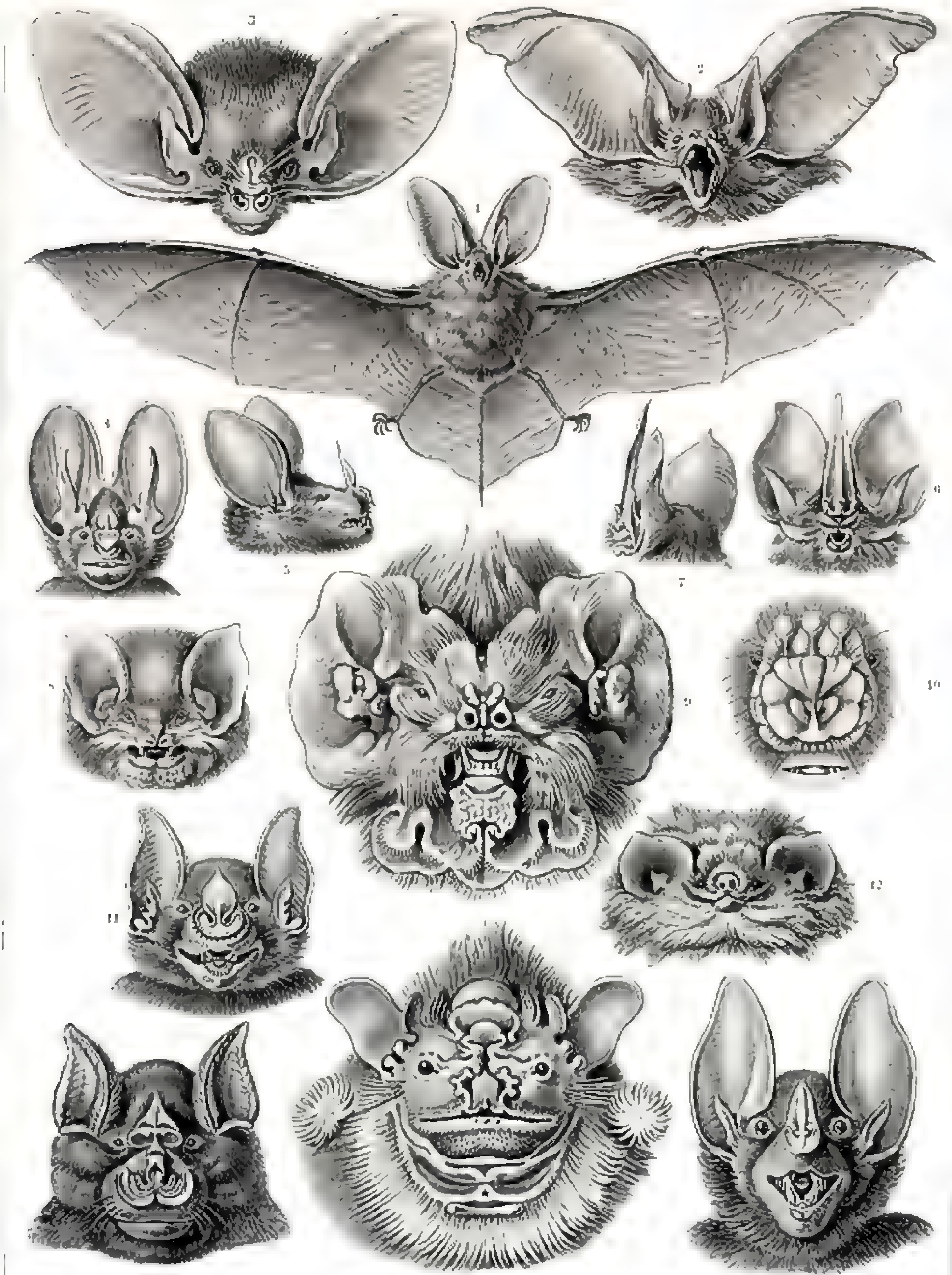
The carbon monoxide and hydrogen from step one are combined catalytically to form gaseous and liquid hydrocarbons. The process was developed by Fischer and Tropsch in Germany in the early twenties. But a low-octane product forced the Nazis to a clumsy coal-hydrogenation process to fuel their war machine.

- Big U.S. contribution to Fischer-Tropsch is a "fluid-bed" reactor, in which a pulverized-solid catalyst acts like a boiling liquid, permitting rapid removal of heat of reaction. And with new catalysts producing high-octane fuel, Fischer-Tropsch now looks commercially exciting in this country.

STEP THREE

The synthetic hydrocarbons from step two pass through recovery columns for separation into high-B.T.U. gas, gasoline, Diesel oil and alcohols. A plant producing 10,000 barrels of gasoline a day could supply heating gas for a city of over two million.

- Since ten of these plants would consume only 20 million tons of coal a year, the hope of the coal industry lies not so much in the volume of coal turned into synthetic fuels as in the stimulation that will be supplied to all of coal technology by petroleum brains and money.



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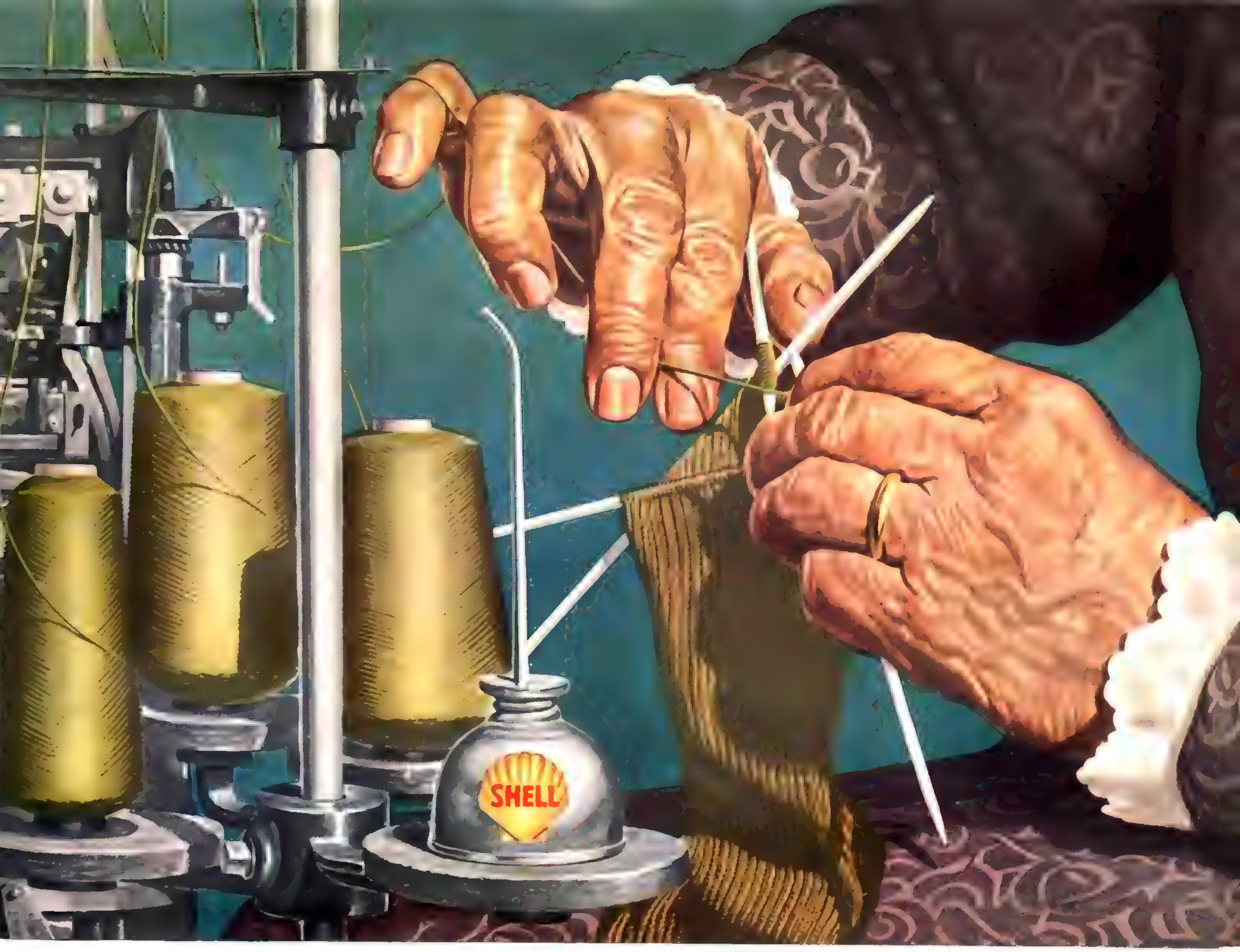

HANES HOSIERY MILLS, big name in "no-seam" hosiery, produces fine nylon and rayon stockings. A Shell Industrial Lubricant solved an important production problem.

Oil for "knitter's cramp"

APRIL 1946

The Symptoms: Hosiery, during knitting, is subject to certain flaws. This means rejects.

The Cause: Gummy deposits, formed by unsuitable lubricants, prevent knitting machines from working smoothly.

The Specific Case: Hanes Hosiery Mills—world's largest producers of ladies' circular knit hosiery—operate several thousand modern knitting machines, each more complex than a fine watch. Moving parts in these machines must work with smooth precision. Uneven action, "knitter's cramp," is disastrous if you're working with gossamer threads . . .

And "knitter's cramp" occurs when lubricants become gummy. Machines may have to be cleaned by hand, costly in both manpower and production.

A Shell Lubrication Engineer suggested Shell Textilis Oil as a cure, and a section of machinery was set aside for a test operation. Results of the test were prompt and conclusive.

After two months, examination of the knitting head lubricated with Shell Textilis found all vital parts exceptionally clean and bright . . . with a thin film of oil present. Other knitting heads, not lubricated with Textilis, were found to be dark in color, or with a gummy residue . . .

Additional sections were then lubricated with Shell Textilis and, after a few weeks, the heads proved to be clean and bright . . . with the needed thin film of oil.

Better yet, Hanes discovered that "seconds" had dropped to an amazing minimum. The drop was credited to smoother machine-action . . . Shell Textilis had overcome "knitter's cramp."

Yesterday's answer to a lubrication problem is seldom good enough for today. Lubricants are constantly being improved at Shell's Research Laboratories. Shell Lubrication Engineers apply these improvements in the field. *Are you absolutely sure that the machines in your plant get the benefit of all that's new in lubrication? Call in the Shell Lubrication Engineer.*

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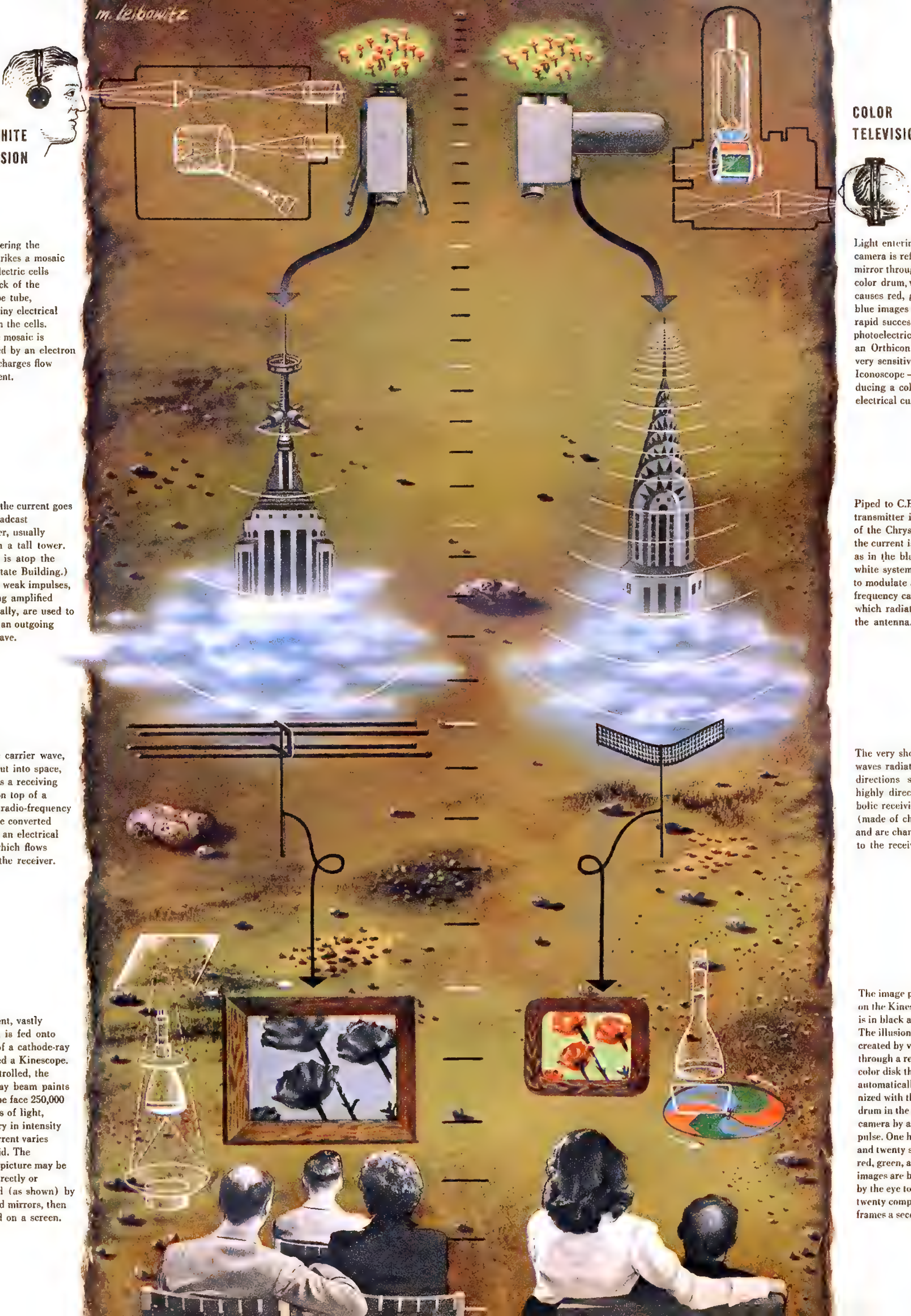

BLACK AND WHITE TELEVISION

Light entering the camera strikes a mosaic of photoelectric cells at the back of the Iconoscope tube, creating tiny electrical charges in the cells. When the mosaic is bombarded by an electron gun, the charges flow as a current.

By cable, the current goes to the broadcast transmitter, usually located in a tall tower. (N.B.C.'s is atop the Empire State Building.) There the weak impulses, after being amplified electronically, are used to modulate an outgoing carrier wave.

When the carrier wave, eddying out into space, encounters a receiving antenna on top of a house, its radio-frequency signals are converted back into an electrical current, which flows down to the receiver.

The current, vastly amplified, is fed onto the grid of a cathode-ray tube called a Kinescope. Thus controlled, the cathode-ray beam paints on the tube face 250,000 pin points of light, which vary in intensity as the current varies at the grid. The resulting picture may be viewed directly or magnified (as shown) by lenses and mirrors, then projected on a screen.

COLOR TELEVISION

Light entering the camera is reflected by a mirror through a rotating color drum, which causes red, green, and blue images to fall in rapid succession on the photoelectric mosaic of an Orthicon tube — a very sensitive type of Iconoscope — thereby producing a color-modulated electrical current.

Piped to C.B.S.'s transmitter in the tower of the Chrysler Building, the current is amplified, as in the black and white system, and used to modulate an ultra-high-frequency carrier wave, which radiates from the antenna.

The very short UHF waves radiating in all directions strike a highly directional parabolic receiving antenna (made of chicken wire) and are channeled to the receiver.

The image projected on the Kinescope face is in black and white. The illusion of color is created by viewing it through a revolving color disk that is automatically synchronized with the color drum in the studio camera by a radio pulse. One hundred and twenty separate red, green, and blue images are blended by the eye to produce twenty complete color frames a second.

Navy landing ship converted by Standard for off-shore oil search. A 55-foot drilling mast is poised over circular 10-foot-wide opening from deck through bottom.

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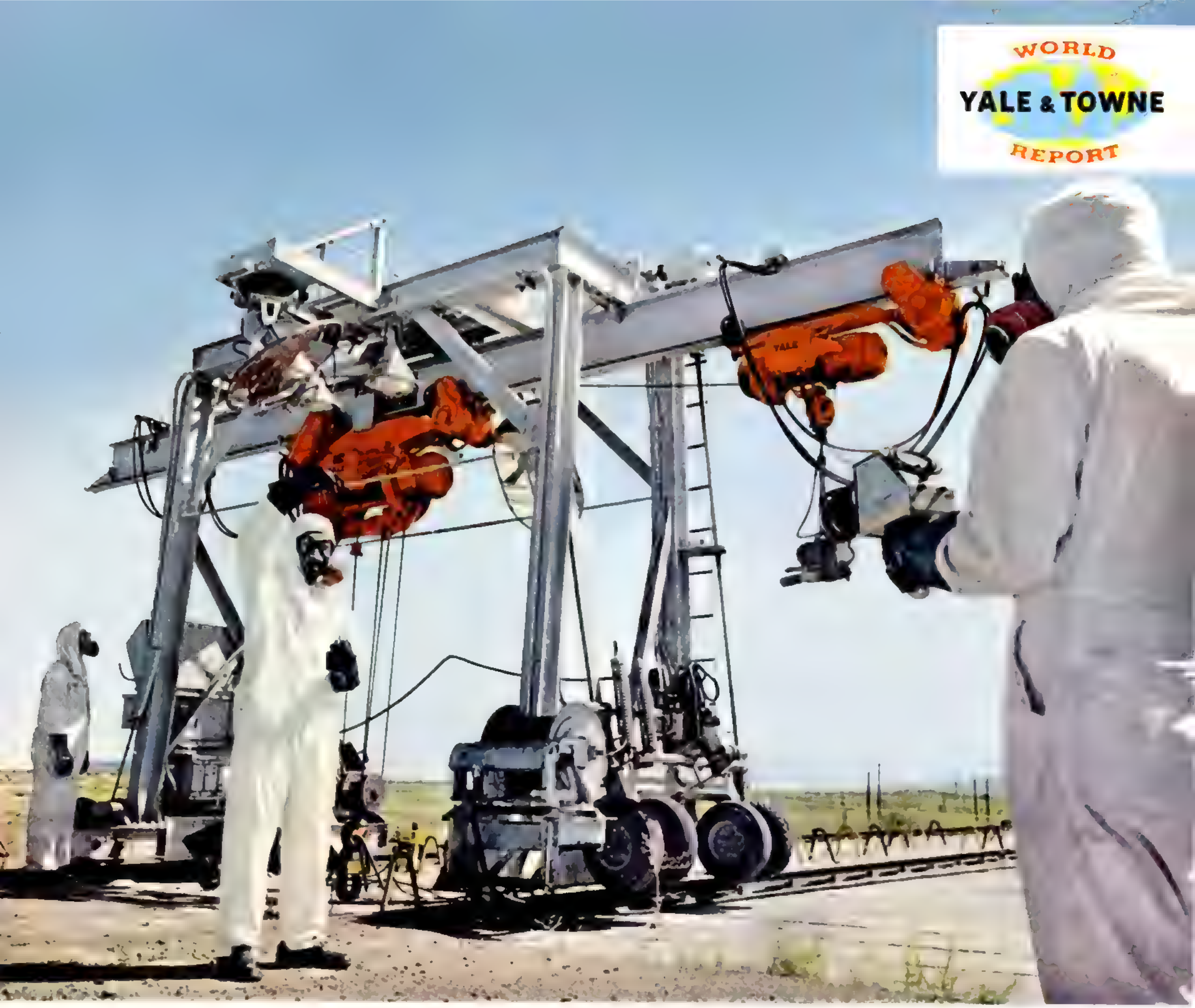
WORLD
YALE & TOWNE
REPORT



June 1957

SCIENCE PIONEERS ATOMIC FUTURE IN DESERT

In the State of Washington, just a few miles from the historic route blazed by early pioneers across the American Northwest, modern pioneers—scientists and technicians—daily employ man's ingenuity to carve out new frontiers in atomic progress. For instance, as vital atomic materials are produced at the Hanford Atomic Plant, operated for the Government by the General Electric Company, a task force undertakes the disposition of radioactive wastes. Technicians, looking like other-planet beings in their protective clothing and masks, are well-seconded by an untiring Yale® hoist mounted on a gantry crane. This reliable hoist's powerful hook lifts the heavy covers of underground vaults so wastes can be channeled to safe storage tanks. And finally, the desert itself—layers of clay, sand and gravel lying in a saucer of volcanic rock—makes an ideal absorbent for other radioactive elements. Yale's Cable King Hoist, other Yale hoists, lift trucks, locks and hardware are working for science and industry toward global security and prosperity.

LLAMAS AND LOCKS IN THE HEART OF OLD PERU

Ancient capital of the once-fabulous Inca civilization of Peru, the city of Cuzco is today a fascinating mixture of old and new. Ruins abound, llamas may be seen in the streets and The University of Cuzco, dating from 1598, recalls the Spanish conquest. Inside the University are rare documents, protected by modern Yale locks—first choice for nearly a century among people the world over who place a premium on both style and security in locks and hardware.

TRUCK SOUNDS NEW NOTE IN YODEL LAND

In Switzerland—where song and industry keep hearts light and hands busy—new ways to get more done include this Yale industrial lift truck handling huge cakes of famed emmenthaler cheese in the town of Thun. Several of these 220-pound cakes are easy going for Yale trucks, whose jobs around the world run the gamut from fragile art treasures in France's Louvre museum to 40-ton dies in a Detroit automobile plant.

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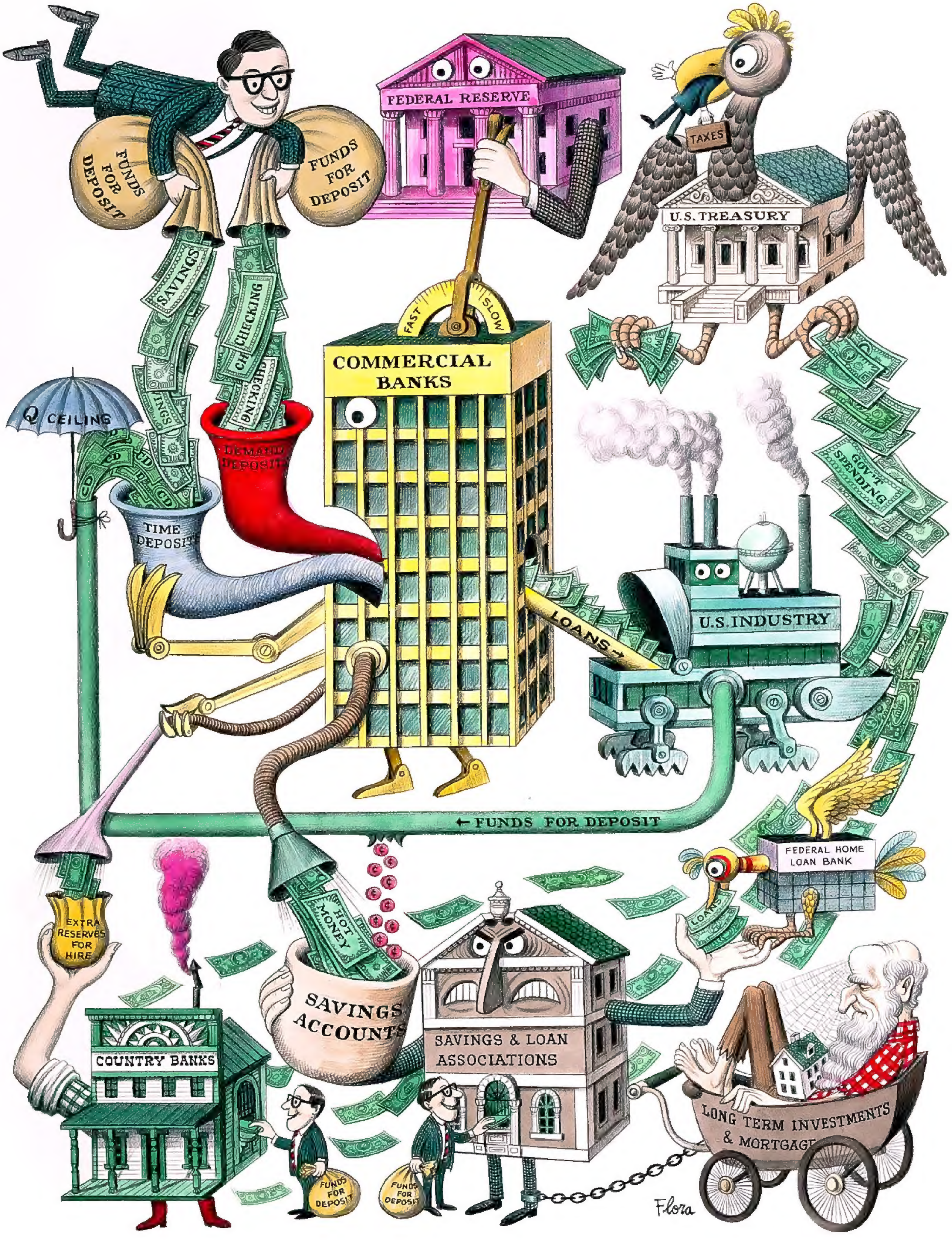
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Visitors experience the illusion of "shrinking" as the Atomobile proceeds into a giant snowflake.

Riders then feel dwarfed by a huge water molecule hanging in space. The breakthrough into inner space is accomplished.

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Snowflakes begin to melt as the visitors are gradually "restored" to normal size.

Atomobiles pass a giant eye looking through the Mighty Microscope.

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